2nd 80s Fire

Equipment Decontamination & Demobilization Plan

04/09/2019

Approval:

Position	Name	Signature	Date
Incident Commander			
FOSC			
SOSC			

9970490

1. Introduction

The purpose of this plan is to identify the establishment of the Equipment Decontamination (Decon) Site prescribed by Unified Command in order to conduct decontamination operations in a safe, organized and efficient manner while minimizing damage to the environment and waste generation.

Additionally, this plan serves to identify general guidance procedures to be followed both day and night by personnel performing decon on all equipment and vessels involved with spill response operations. Because these operations may involve transiting through slicks, operating within impacted waters or recovery operations, we may assume that vessel hulls, decks, machinery, tanks, piping, deck gear and other areas will be impacted. This plan will be used for all vessels, mechanical recovery equipment, and support equipment, either contaminated or suspected of being contaminated, in order to return all to a non-impacted state.

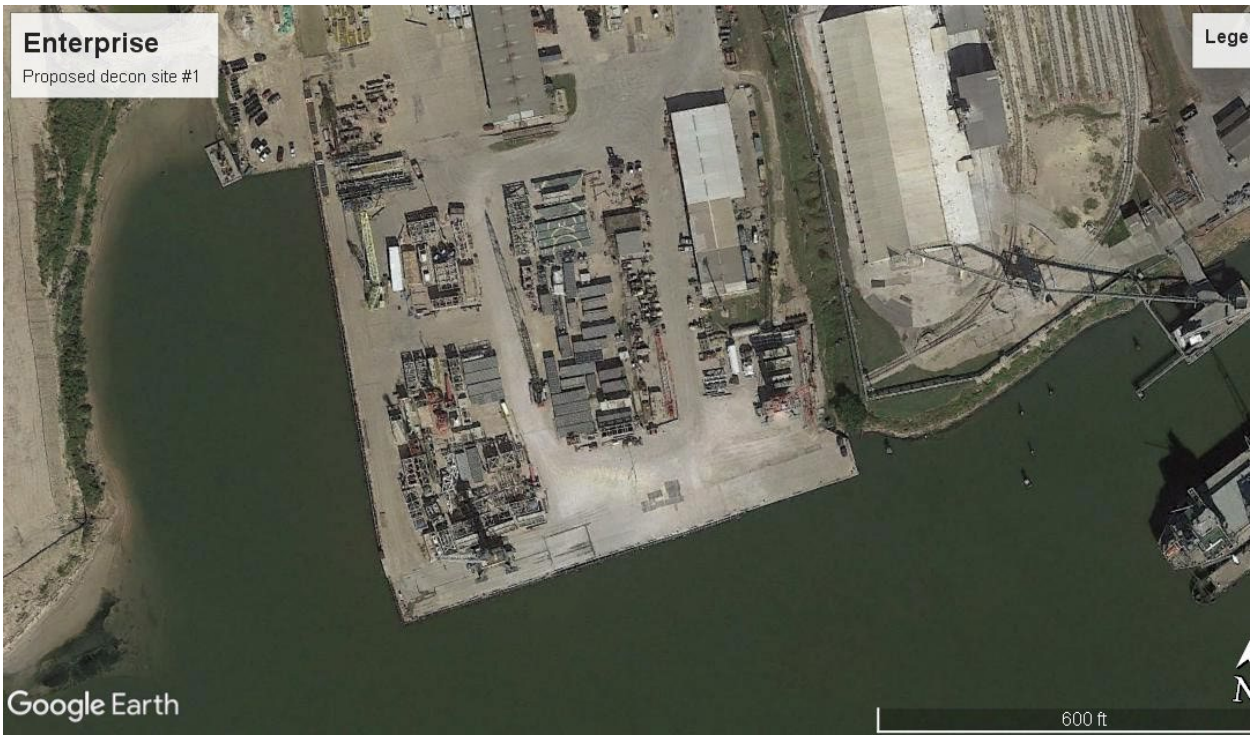
2. SITE SPECIFICS

This site is presented as a proposed option for Decon activities

Proposed Decon Site
Site Name: Enterprise
Physical location: East of Beltway 8, east end of Enterprise property. West of ITC property
Address: 15902 Peninsula St., Houston, 77015
Description: 4 acre site with bulkhead, crane and secure access and egress. West bulkhead measures 650'. South bulkhead measures 650'. Total available bulkhead is 1300'. Level, clean concrete pad.

Contact Person: Tyson McMahon

Phone: (281) 860-4719



3. SITE PREPARATION

Upon approval of the plan and when access is granted to the facility, initial cleanup operations are necessary. These will include initial cleaning of larger asphalt debris and scattered garbage already present on site. This will be facilitated with the use of skid steers and large street sweeper.PResmission has been granted by the landowner (Enterprise) to store this debris on site. A final walk through and additional sweeping if necessary, will be conducted by a small labor pool under direction. In addition, an existing layer of mud must be removed in order to properly prepare one area for use. This mud and dirt will be stored onsite. The decon area may need additional rock or crushed asphalt to provide the most level and safest work area possible.

4. EQUIPMENT DECON OVERVIEW

Industry standards and best practices require, and Oil Spill Removal Organizations (OSROs) and regulators demand, that the Responsible Party (RP) must decon all equipment that was deployed in response to the spill before it is released from the incident and returned to its owners. This applies to boats and boom, but also applies to trailers, pumps, skimmers, pressure washers, etc.

The purposes for promptly establishing a Decon site and operating procedures at any spill are several:
to ensure that the contractor-owned and government-owned equipment will be ready for deployment at the next spill or drill without causing a sheen when it is deployed; so that equipment hauled over the road doesn't drip product or otherwise spread contamination beyond the spill site, particularly onto roads or parking lots. In most states this is a requirement by state transportation and/or environmental agencies; so that equipment is returned to its owners in roughly the same condition it was in when it arrived; and as a cost control measure, so that equipment that is either no longer needed for the response or has broken down or can otherwise no longer be used, is returned to its owner as quickly as possible so that it comes "off the clock."

All contaminated equipment used in the spill response will be deconned to a condition of cleanliness agreeable to both the Unified Command and the equipment owner.

Consumable supplies for Decon operations will be provided through the established OSRO(s) for this incident.

The T&T barges, MSRC OSRV, and Clean Channel Co-op barges mobilized for this response will be decontaminated according to specific procedures provided by T&T, MSRC and CCC and as such, are outside the scope of this Plan.

5. ORGANIZATION

The Decontamination Group will be organized as follows:

- Decon Group Supervisor
- Decon Strike Team Leaders
- Decon Manager
- Decon Supervisor
- Boom Decon Foreman
- Vessel Decon Foreman
- Equipment Decon Foreman
- Site Safety Officer

- Air Monitoring Project Manager
- Documentation (IAP Software Staff)
- Site Check-in Recorders

6. CONCEPT OVERVIEW

In view of the extensive equipment inventory involved in this response effort, the Decon Contractor will do the following:

- oversee gross decontamination of response vessels, in the field prior to transition to decon site;
- establish and oversee temporary berthing of impacted vessels; and
- oversee final decontamination of spill recovery vessels, response vessels, containment boom, mechanical skimmers and other response equipment.

The primary focus of this operation will be to expedite cleanup of impacted vessels and response equipment in a safe, organized and efficient manner while minimizing further damage to the environment and waste generation. Personnel health and safety will be of utmost importance during all decon operations.

Equipment decontamination will occur as follows:

- Recovered product is to be off-loaded from skimmer cargo tanks to portable storage tanks and/or vacuum trucks pending transfer to ITC in accordance with the incident-specific Waste Handling Plan
- Equipment to be transferred into a bermed area and decontaminated.
- All equipment will undergo full decontamination prior to demobilization.

7. DOCUMENTATION

In accordance with the approved Demobilization Plan, the decon process will be documented utilizing the ICS 221 (Demobilization Form). Each piece of equipment that is to be decontaminated will be documented in order to track equipment undergoing decon as well as to document acceptance of the equipment by its owner when decon is complete.

Paper and electronic files will be maintained by the Decon Group Supervisor and Decon Manager for each piece of equipment and each batch of boom that comes to the site. Copies of all completed decontamination and release forms will be provided to the Resource Unit Leader and IAP Software Staff daily so that response resource records can be maintained up to date.

All Decon files will be turned over by the Decon Group Supervisor and Decon Manager to the Documentation Unit Leader, with copies to the Finance Section Chief, upon completion of Decon operations and demobilization of the Decon site.

8. DECONTAMINATION PROCEDURES

7.1 Safety

Personnel safety will always be the highest priority at the Decon site. Air monitoring will be conducted in accordance with all state and federal regulations, and with the incident-specific Work Area Air Sampling and Analysis Plan.

See Attachment **A -** Site Specific Safety Plan

7.2 Confined Space

Any confined space entry required as part of this decontamination project will be issued a confined space entry permit and rescue team will be on standby.

Equipment decontamination is planned to occur in two phases:

- Recovered product is to be off-loaded from skimmer cargo tanks to portable storage
- tanks and/or vacuum trucks pending transfer to ITC in accordance with the incident-specific Waste Handling Plan.
- Equipment to be transferred into a bermed area and decontaminated.
- All equipment will undergo full decontamination prior to demobilization.

A priority assessment of each piece of equipment will be made by the Decon Manager as it arrives at Decon, to ensure a timely flow of equipment through the decon process and to ensure that higher cost equipment is able to be demobilized as promptly as possible. The Logistics section will provide guidance in this regard; e.g., Logistics will notify the Decon Manager when a high-cost piece of equipment such as a self-propelled skimmer is scheduled to be demobilized soon and/or is on its way to Decon. Depending upon the priority assigned by the Decon Manager, equipment will be directed to either the Decon staging area or to a decon pool.

If equipment arrives at Decon by water, the shoreline will be lined with visqueen, industrial cloth or other appropriate material to prevent damage to the shoreline and/or secondary contamination by the impacted equipment, as well as to prevent damage to the equipment.

All decon operations will take place in Decon pools, which will be set up on either side of an open roadway such that trucks and trailers can safely enter and exit without turning around and without interrupting work operations or endangering personnel. The pools will be set up on clean, flat ground on layers of visqueen and industrial carpet or 40 mil HDPE matting. Each decon pool will be constructed with a wide swath of visqueen around it to allow for splash potential and will be bordered by curbing that includes sorbent boom in order to prevent effluent from the pools from escaping containment and contaminating the ground.

Trucks will be backed into a pool to be cleaned. Boats, skimmers and other equipment will be set in a pool by forklift or crane if required.

All trailered equipment will be backed into a decontamination pool.

Upon entering a pool, all equipment will first be thoroughly sprayed down with degreaser and scrubbed and / or hot water washed until clean. A bio degradable cleaning solution, yet to be determined and approved by the UC, will be utilized as a degreaser and will be applied by a Hudson sprayer as applicable. The cleaning solution to be selected may be citrus based so that it does not leave a petroleum sheen on the equipment after the cleaning process. Once approved by the UC an SDS for the cleaning solution will be provided. Actual pressure washing, if required, will utilize a hot/cold pressure washer with a temperature range up to 220° F and a pressure rating up to 5000 psi. All personnel tasked with operating pressure washers shall be required to wear modified PPE Level D which can include, but is not limited to raingear, gloves, eye protection and metatarsal guards.

Every attempt will be exercised to mitigate noise-generating equipment by placing it in insulated areas. Once the piece has been determined clean to the owner's standard, the equipment will be demobilized.

9. CONTAINMENT BOOM AND PORTABLE EQUIPMENT

A separate decontamination area has been identified for containment boom and small equipment. The above-mentioned method will be used to clean all containment booms and any small equipment involved in the spill response. Boom will be bundled and tied in 100 ft sections and returned to their owner once it has been inspected by them and approved. Mechanical recovery equipment may require a breakdown to allow for access to areas and components of that equipment which may harbor residual product not readily visible or observed during visual inspection.

Vessels transporting boom to the Decon Site will deliver the boom to a barge platform to be tied to the western dock space of the facility. This boom will be lifted by crane of other mechanical means over the bulkhead and placed upon a protected area for initial inspection and assessment. This initial inspection is meant to determine ownership and condition of the boom received. All boom deemed damaged beyond reasonable repair will be marked as such. Each length of boom will be tagged stating ownership (as possible and to a reasonable confidence) and condition. Boom identified by Decon Group Supervisor as damaged beyond repair will be segregated. Boom will be manually loaded into the decon pool for cleaning by assigned technicians. Once clean, boom will be removed and bundled and tied in 100 ft sections and sent to a designated area for pick up. All boom will be returned to their owner once it has been inspected by them and approved.

Deployed boom may also be collected at a designated site where the boom will be loaded into lined 20 yd or 25 yd roll-off containers with gasket sealed doors for transport to the Decon site. These roll offs will be staged at an area at the Decon Site and placed within a protective berm. Boom to be deconned will be manually removed from the roll off and placed upon a protected area for initial inspection and assessment. This initial inspection is meant to determine ownership and condition of the boom received. All boom deemed damaged beyond reasonable repair will be marked as such. Each length of boom will be tagged stating ownership (as possible and to a reasonable confidence) and condition. Boom identified by Decon Group Supervisor as damaged beyond repair will be segregated. Once tagged and ready for decon this boom will be transported to the decon pool by small open trailer or other means. Boom will be manually loaded into the decon pool for clean by assigned technicians. Once clean, boom will be removed and bundled and tied in 100 ft sections and sent to a designated area for pick up. All boom will be returned to their owner once it has been inspected by them and approved.

10. RESPONSE VESSELS

For purposes of enhancing personnel safety we recommend that transport of the response vessels to the Decon Site be conducted by trailer. All vessels identified for decon/demob will initially be gross deconned at their dedicated launch sites. This process will include a thorough wipe down of each vessel as it is removed from the water and trailered. All vessels will be trailered on individually assigned trailers as identified and confirmed by the registered and contracted owner or named representative. This wipe down will be facilitated with an appropriate pad (chemical/oleophilic). The approved cleaner will be applied to a pad which will then be used for the wipe down process. No Hudson sprayers will be used to apply the approved cleaner and no pressure washers will be used to clean the vessels at this stage, minimizing any possibility of impact to both public boat ramps. All liquid observed within the vessel hull and on deck will be removed means of vacuum system and/or rags/pads as required. Once liquids are removed, boat plugs will be confirmed to be in place and secure. This will greatly limit any chance of

residual liquids being lost in transit to the approved Decon Site. Wastes generated during the wipe-down process will be handled in accordance with the incident-specific Waste Handling Plan.

Vessels arriving at the approved Decon Site by trailer will be directed to the designated decon area for that equipment. Boat trailers with boats will be staged in the vicinity of the next available decon pool. These boats and trailers will then be backed into a decon pool utilizing a fork lift outfitted with a ball hitch. Once completed and confirmed clean the trailer and boat will be removed from the decon pool and staged for pick up by the owners' truck for demob and final transit returning these vessels to their home facility.

Alternatively, vessels can transit on water to the Decon Site. Vessels will be lifted with a crane operated by a certified Crane Operator and using a Certified Rigger. Due the variety of vessels now deployed this will require several sizes of strap sets to be fabricated in order to be prepared for the different vessel hull sizes and configurations. This initial pick will remove the vessel from the water and then place the vessel within a decon pool, set upon cribbing which will need to be adjusted to conform to the hull configuration and size of each vessel. Vessels will be blocked using 12"x12" wood cribbing. A decontamination team will be assigned to the vessel decon pool. Vessels will require the hull to be washed / wiped to remove residual product. All efforts will be made to remove residual product from the hull and machinery. This decontamination process will include the application of the approved cleaner by Hudson sprayer, scrubbing and pressure washing as necessary. Additional picks/lifts may be required to facilitate freeing up the decon pool for continuous operations. Clean vessels may be required to be staged while awaiting their assigned trailers for final demob and transit to their home facility. Upon arrival of the vessels assigned trailer the vessel will be lifted a final time for placement aboard it's trailer. The vessel will be released from the decon area following an inspection, approval, and signature by the owner.

11. DECON GENERATED WASTE WATER

Rinsate generated from decon operations will be collected from the pools by a vac truck and transferred to frac tanks. As the liquid level in a frac tank approaches approximately ¾ full, the Decon Manager/Decon Foreman will request a 130 bbl vac truck to transport the contents to ITC in accordance with the incident-specific Waste Handling Plan. The final disposal of liquid and solid wastes will be pursuant to the Unified Command's approved waste management plan.

12. CERTIFICATE OF DECONTAMINATION

For this project, a Certificate of Decontamination (Attachment B) has been created. This document reflects the date of entry into the decontamination area along with an adequate description of each piece of equipment to be decontaminated. Once approved by the equipment owner's representative, the said representative will sign and date the certificate of decontamination. A digital photo will accompany the certificate of decontamination and will be turned in to the spill management team.

Once a piece of equipment has been determined to be clean by the Decon Manager, it will be moved to a clean holding area at Decon and the owner's authorized representative will be notified. The owner's authorized representative will signify his/her concurrence that the equipment has been sufficiently cleaned by completing and signing the Released to Owner section of the Certification of Decontamination form.

As it comes out of the pool, each section of boom will be bundled and tied, a uniquely numbered tag, including owner identification, will be placed on each bundle by the Foreman (including destroyed boom), and the tag numbers will be recorded by the Foreman and/or the Supervisor. Not all boom will be photographed as it arrives at Decon - only sections of boom that are determined by the Decon Manager and/or the Foreman to be damaged beyond repair will be photographed.

A Boom Release from Decon form (Attachment C) will be executed for each quantity of boom that is picked up by its owner, which will document the size and total number of feet of boom covered by that form, the number of feet considered serviceable, the number of feet considered damaged but repairable, and the number of feet that are damaged beyond repair and will be retained at Decon and managed in accordance with the incident-specific Waste Handling Plan. These forms will be cosigned by the owner's representative and the Decon Manager or Foreman, and a copy given to the owner's authorized representative.

A support zone will be established within the Decon site for consumable supplies, bottled water, etc. At least one break tent and/or building will also be established within the Decon site to allow workers to take breaks out of the weather.

13. SAFETY/SECURITY

All personnel working in or near the pools will always be properly attired in raingear, gloves, eye protection and metatarsal guards. In the interest of maintaining a safe work environment, workers who violate this PPE policy will receive one warning and will be subject to possible dismissal for subsequent violations.

A site-specific Safety and Health Plan will be established for the Decon site and appended to the overall response Site Safety and Health Plan. Air monitoring will be conducted in accordance with all state and federal regulations and the incident-specific Work Area Air Sampling and Analysis Plan. A contracted ambulance will always be staged on site when decon activities are in progress.

- All personnel engaged in Decon activities shall possess a valid TWIC.
- A contracted ambulance will always be staged on site when decon activities are in progress
- 24-hour site security will be maintained at the Decon Facility throughout the decon process.

14. PERSONNEL REQUIREMENTS

Decon will be coordinated by the Decon Group Supervisor (TRG) and managed by the Decon Manager (NRC). Decon will be staffed by the selected Decon contractor in such numbers of supervisory personnel and workers as the Decon Manager deems appropriate each day as the workload varies.

Operations will run up to 24 hours a day, in two shifts up to 12 hours each, as the Decon Manager deems appropriate each day considering the amount of equipment ready to be decontaminated and demobilized on a given day. The anticipated maximum number of personnel required for a shift will be as follows, although work demands may at times call for more:

Positions (per shift)

- Decon Group Supervisor (1)
- Decon Strike Team Leaders (2)

- Decon Project Manager (**2**)
- Decon/Staging Transportation Coordinator (4)
- Decon Supervisor (**4**)
- Decon Foreman (**6**)
- Decon Site Safety Manager (**1**)
- Decon Site Safety echs (**3**) Equipment Operators (**4**) Fuel Delivery Driver (**1**)
- 70 bbl Vac Truck driver (3)
- 130 bbl Vac Truck driver (**1**) Roll off truck driver (**1**) Techs demob pad (**2**)
- Techs dirty pad (**2**)
- Storekeeper for Central Supply (**1**) Decon Foremen (**6**)
- Decon Technicians (**104**)
- Air Monitoring Teams (**6**)*
- Admin (2)
- Logistics/Finance (2)
- IAP Software Staff (2)
- Check-in Recorders (2)

*Two man team per 12 hour shift with AreaRAEs to cover the work area and perimeter monitoring of decon (one to man the computer console and one to maintain equipment and verify readings). Plus one person per shift to roam the neighboring facilities for VOCs and benzene

15. EQUIPMENT REQUIREMENTS

The following equipment will be used to conduct Decon operations, although it is recognized that other equipment and/or supplies may be utilized as determined by the Decon Manager in consultation with the Foreman:

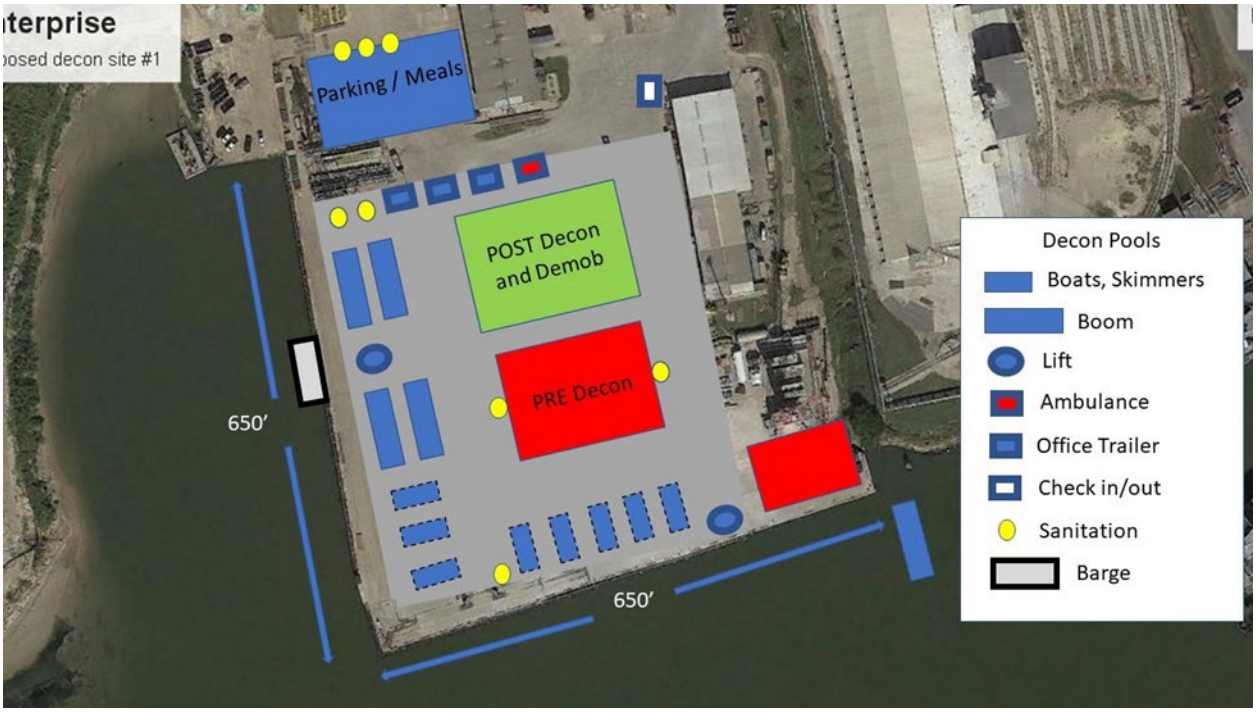
Qty.	**Description**	
2	Mobile Office/Command Trailers	
1	Equipment Trailers, Central Supply	
2	ATV/UTV	
20	Hand held radios with belt or shoulder clip	
tbd	charging stations and additional batteries	
2	Forklift	
2	JLG (Extended Reach Fork Lift)	
4	25' X 110' Decon Pools	
8	25' X 50' Decon Pads	
75	4' x 6' containment pool for light towers	
2	Digital Cameras	
24	3500-5000 psi Hot Water Pressure Washers	
3	15 kW Generators	
2	Office/Construction Trailer	
145	Level D PPE	
11	Level C PPE (Confined Space Entry Personnel)	
2	Frac Tank, 500 bbl	

3	70 bbl Vac Trucks (all with duck bill skimmers)	
1	130 bbl Vac truck	
2	185 cfm Air Compressors	
24	2" Single Diaphragm Pump / Wash pump	
1000’	2" Suction/Discharge Hose	
3	Explosion Proof Lighting	
50	Portable Light Towers	
15	20 lb. ABC Fire Extinguishers	
2	CSE Safety Equipment (Tripod, Winch, Harnesses, Etc.)	
2500	Waterproof Equipment Tags, Permanent Markers	
15	25 cubic yard Roll Tarp Roll Off Boxes (contaminated)	
2	25 cubic yard Roll Tarp Roll Off Boxes (household)	
17	Roll Off Box Liners	
	Air monitoring equipment (AreaRAEs, UltraRAEs, others as necessary)	
3	27’ Boats	
1	Crew Tent (40’x80’)	

16. SITE DEMOBILIZATION

Upon final breakdown and closure of the equipment decontamination operation, a joint survey of the facility will be conducted by the Responsible Party, EPA, and other participating agencies. Any signs of contamination from the decontamination operation will be addressed by the Responsible Party to a mutually agreed condition of cleanliness.

17. PROPOSED SITE LAYOUT



Attachments:

- Boom Release from Decon form
- Certificate of Decontamination
- Site Specific Safety Plan

CERTIFICATE OF DECONTAMINATION

DATE of entry to decon site _____

Equipment description _____

_____

Equipment owner/identifier _____

Visible damage observed YES _____ NO _____

If yes, please provide a brief description AND photo documentation of observed damage

DATE decon completed (determined by Decon Manager/Supervisor) _____

Owner notified of decon completion on this date _____

Released to owner / Date and time _____

Owner acknowledgement of release _____

(owner or representative signature and date)

Decon Manager/Supervisor confirmation of release and departure from decon site

_____

(Decon Manager/Supervisor signature and date)

BOOM RELEASE FORM

DATE of release from decon site _____

Equipment owner/identifier _____

Boom size _____ Solid _____ Inflatable _____

Boom quantity (total) _____

Boom quantity (serviceable) _____

Boom quantity (repairable) _____

Boom quantity (damaged beyond repair) _____

***Provide a brief description AND photo documentation of observed damage* _____**

_____

_____

Notes _____

_____

_____

Released to owner / Date and time _____

Owner acknowledgement of release _____

(owner or representative signature and date)

Decon Manager/Supervisor confirmation of release and departure from decon site

_____

(Decon Manager/Supervisor signature and date)

Second 80's Fire – Emergency Response

April 9, 2019

Intercontinental Terminal Company Decontamination

HEALTH AND SITE SAFETY PLAN

INTERCONTINENTAL TERMINAL COMANY
2626 TIDAL RD, DEER PARK, TX 77536
MARCH 30, 2019

NRC & OTHER PROJECT PERSONNEL, UNIFIED COMMAND AND EMERGENCY CONTACTS		
NRC Regional ER Manager	Antonio Rodriguez	281-796-6881
NRC Senior Project Manager	Charles Comerford	832-857-8194
NRC Account Manager	Charlie Bryant	832-795-7827
NRC HSEQ Manager (Safety Officer)	Mark Theriot	978-270-8213
Medical Hospital	Hermann Memorial Hospital 6411 Fannin St. Houston, Tx (281)929-6100	(281)929-6100

GENERAL INFORMATION & SITE DESCRIPTION

Location: Enterprise Dock located at 15902 Peninsula St, Houston, Tx. 77015

Point of Contact: Tyson McMahon (281)860-4719

The site is 4 acres with secure access and egress. There is a total of 1300 feet of bulk head available with a large area of smooth level concrete.

Please see the NRC Decontamination plan for more information on site, complete with site diagram and layout.

SCOPE OF WORK

- Decontaminate all equipment materials that were used for the 2nd 80's Fire Chemical Clean up.
- Provide support to the Unified Command to support de-mobilization of assets and equipment once it is no longer needed for the response.
- Using rags, hot water pressure washers and booming strategies for vessel decontamination based on the needs of the project.
- Follow the NRC decontamination plan.

APPLICABLE REGULATIONS

29 CFR 1910.132 & 133	Personal Protective Equipment
29 CFR 1910.134	Occupational Health
29 CFR 1910.120	Hazardous Waste & Emergency Response Operations

EQUIPMENT

- 130 bbl Vac truck(s)
- 70 bbl Vac truck(s)
- 500 bbl Frac tank(s)
- Lifting Crane
- All-terrain fork lift Crane truck
- Light towers
- 5K PSI Hot / Cold pressure washers

- 2" diesel centrifugal pumps

- Approved Degreaser

- Hand-operated sprayers (Hudson sprayers)
- 25' x 50' Decontamination pools
- 25' x 110' Decontamination pools
- Sorbents I Visqueen
- PPE
- Hand tools
- Wood pallets

CHEMICAL INFORMATION

CHEMICAL	EXPOSURE LIMITS	ACTION LEVELS	ROUTES OF ENTRY	SYMPTOMS
Petroleum Products				
Benzene (CAS 71-43-2)	PEL: 1 ppm REL: 0.1 ppm IDLH = 500 ppm	Exceeds 0.5 ppm – ½ face respirator w OV/P100 combo filters Exceeds 10 ppm – Full face respirator w OV/P100 combo filters Exceeds 50 ppm – Shut down project to regroup	Inhalation Ingestion Absorption Skin Contact	Respiratory, skin, & eye irritation, Nausea, Headache, Dizziness, Confusion, Blood & nervous systems effects, Bone marrow, Staggered gait, lassitude, Carcinogen
Ethylbenzene (CAS 100-41-4)	PEL: 100 ppm REL: 100 ppm IDLH = 800 ppm	Benzene & Naphthalene components most conservative	Inhalation Ingestion Absorption Skin Contact	Respiratory, skin, & eye irritation, Nausea, Headache, Dizziness, Dermatitis, Narcosis, Coma
Toluene (CAS 108-88-3)	PEL: 200 ppm REL: 100 ppm IDLH = 500 ppm	Benzene & Naphthalene components most conservative	Inhalation Ingestion Absorption Skin Contact	Respiratory, skin, & eye irritation, Nausea, Headache, Dizziness, Confusion, Lassitude, Euphoria, Blood & nervous systems effects, dilated pupils, Excess tears, Anxiety, Muscle fatigue, Insomnia, Tingling or itching of skin, Liver & kidney damage, Carcinogen

CHEMICAL INFORMATION

CHEMICAL	EXPOSURE LIMITS	ACTION LEVELS	ROUTES OF ENTRY	SYMPTOMS
Xylenes – all isomers (CAS 1330-20-7)	PEL: 100 ppm REL: 100 ppm IDLH = 900 ppm	Benzene & Naphthalene components most conservative	Inhalation Ingestion Absorption Skin Contact	Respiratory, skin, & eye irritation, Nausea, Dizziness, Excitement, Drowsiness, Vomit, Staggered gate, Incoordination, Dermatitis, Abdominal pain

See attached SDS for more information

HEALTH AND SITE SAFETY PLAN

INTERCONTINENTAL TERMINAL COMANY
2626 TIDAL RD, DEER PARK, TX 77536
MARCH 30, 2019

Instrument	Reading	Action
MultiRAE Lower Explosive Level		
Continuously Monitor to detect % LEL.	< 0 – 2.5 % LEL	• Safe from fire hazard • Level C Minimum Respiratory protection • Continue normal operations • Continuous push / pull ventilation – supply at the bottom and exhaust from the top. • Monitor effluent air with PID • Continuous interior monitoring
	2.5 – 10% LEL	• Safe from fire hazard • Level B Respiratory protection • Continuous push / pull ventilation – supply at the bottom and exhaust from the top. • Monitor exhaust air • Monitor interior air
	> 10% LEL	• Shut down operations • Investigate source of high LEL • Remove liquid • Increase push /pull ventilation until < 10% LEL – supply at the bottom and exhaust from the top.
MultiRAE Oxygen		
Continuously Monitor to detect % oxygen. - monitor interior of tank at lowest point	19.5 – 23.5 %	• continue push / pull ventilation • Continue normal operations • continue use of Level C if entry required (Concentration of contaminants determine level of respiratory protection)
	< 19.5 %	• continue push / pull ventilation – supply at the bottom and exhaust from the top. • IDLH situation: Level B if entry required
	> 23.5%	• continue push / pull ventilation – supply at the bottom and exhaust from the top. • IDLH situation: No Entry
Benzene Detector PID (VOCs)		
Monitor at surface level to detect vapors > air.	< 10 ppm <.5 PPM Benzene	• Safe from toxicity hazard, Level D • Continue normal operations • Continuous push / pull ventilation – supply at the bottom and exhaust from the top. • Continuous interior monitoring
	10 to 250 ppm .5 ppm to 25 PPM Benzene	• Continue operations in Level C • Continuous push / pull ventilation – supply at the bottom and exhaust from the top. • Monitor exhaust air • Monitor interior air
	>250 PPM >25 PPM	• Continue operations in Level B (supplied air) • Continuous push / pull ventilation – supply at the bottom and exhaust from the top. • Monitor exhaust air • Monitor interior air

PERSONAL PROTECTIVE EQUIPMENT

PPE requirements will be referenced to the EPA levels of protection (A-D).
Specific descriptions for task and level of protection is provided below

TASK	Level	MASK /CARTRIDGE /AIR	ADDITIONAL PPE
Vessel Operation	**D**	**N/A - Unless PID (on the 4-gas PID meter) shows > 25 PPM VOC for sustained 15 min) Or if Benzene level is detected above 0.5 PPM**	Safety toed neoprene or other appropriate boots required while working on the vessels, work clothing, (long sleeved), Type III PFD, or float suit. Hardhat when out on deck when in vicinity of larger vessels or adjacent to piers.
Vessel Decon	**D**	As above	Safety toed neoprene or other appropriate safety-toed boots required while working on the vessels. Safety glasses, work clothing (long sleeved), gloves, PFD, or float suit. If pressure washing wear poly coated Tyvek suit (Lakeland Chem Max 1 or equivalent), chemical impervious gloves such as nitrile inner with PVC outer gloves. Face shield required when pressure washing.
Boom retrieval	**D**	As above	Safety toed neoprene or other appropriate boots required while working on the vessels, Poly coated Tyvek suit, safety glasses, work clothing (long sleeved), PVC gloves, PFD, or float suit. Hardhat if adjacent to larger vessels or piers.
Decontamination	**D**	As above	Eye/face protection if pressure washing; safety toed boots, rain gear, PVC gloves, PFD if at risk of fall into water; hardhat if adjacent to larger vessel or other overhead

- PPE items are stored in NRC Emergency Response Vans and trailers with a larger supply kept at the NRC Warehouse and Offices. PPE items, e.g. gloves, limited number of PFDs, raingear and safety glasses are also kept aboard NRC's larger workboats.
- Each of NRC's potential response personnel are issued a gear bag of basic PPE upon initial employment (i.e. hardhat, raingear, various gloves, safety glasses, high-visibility safety vest and half-face APR) and expected to bring same with them when reporting for duty.
- Should any temporary labor employees arrive without Level D PPE, they will be issued requisite items, as needed.

HEALTH AND SITE SAFETY PLAN

INTERCONTINENTAL TERMINAL COMANY
2626 TIDAL RD, DEER PARK, TX 77536
MARCH 30, 2019

ACTIVITY HAZARD ANALYSIS

Hazards Throughout the Job		
ITEM	**HAZARD**	**PREVENTION**
General Vessel & Shoreline Work Area	Slip / trip / fall Hazardous atmosphere	• Designated pathways cleared of debris. • PFD worn by all personnel. • Benzene levels above 0.5 PPM require Air purifying respirators are required in designated areas. Refer to Daily HASP or STARRT card to see if your assigned work area is in the designated zone.
General Work Area – lifting	Strain Sprain	• Stage equipment to minimize long distance carrying. • Split heavy loads into smaller loads. • Request assistance for heavy or awkward loads. • Use mechanical device to move objects when possible.
Prolonged exposure to elements	Hyperthermia	• Crews with long sleeve shirts to cover skin. Weather appropriate protective clothing; frequent breaks & fluids
Break time	Ingestion	• Thoroughly wash hands before eating, drinking, smoking, skin lotion, putting on sunscreen.
Spill Prevention and Control	Spilled waste products	• Inspect daily all fuel hoses, fuel storage containers, lubrication equipment, etc for drips, leaks or signs of damage. • Inspect all equipment and vehicles for significant fuel and oil leaks.
Noise Control	Hazardous Noise	• Vessel engines may exceed 85 dbA, as may equipment operating within areas of operations, e.g. vacuum trucks. • Hearing protection worn at all times when using pressure washers or vacuum trucks near the decon pools. • Break area will be far enough away from the work area so that hearing protection won't be required.
Vessel Safety	Struck by Grounding Collision	• Vessels will be inspected at beginning of each shift. • Any discrepancies will be corrected prior to the vessel being used. • Vessel operators will obey traffic laws at all times. • Follow "Rules Of The Road". • Vessels check-in and maintain operational communications
Waste Management	Slip/trip/fall Contact with Oiled materials	• Proper temporary storage and handling (bags, drums,etc) • Proper PPE • Follow disposal plan
Vessel Decontamination	Slip/trip/fall Chemical Exposure Pinch / Crush points Heat Stress Pressure Washing	• Look where going and go where looking • PVC outer gloves with nitrile inner gloves. When pressure washing use a poly coated Tyvek suit as well • Identify and avoid all pinch / crush points, communicate and avoid. If two water craft are going to collide, don't put any part of the body over the gunnel of the boat to stop. • When using a hotsie all chemical PPE is required as well as safety glasses and a face shield or a full face respirator.

- Managers, Supervisors, Vessel Masters and Vessel Operators are responsible for ensuring compliance with the above and below indicated prevention measures, as well as other operational safety and regulatory requirements in this plan.
- All employees are responsible for complying with all prevention measures, and other operational safety and regulatory requirements of this plan.
- The Safety Officer is responsible for instituting the site safety plan and monitoring for compliance; receiving reports and reporting any serious incidents, accidents or injuries immediately to Command; and working closely with Logistics to ensure that appropriate communications are in place to support the response effort.
- Boat crews will utilize the 2-person Buddy System and watch out for the safety of each other.

WORK PLAN & HAZARDS UNIQUE TO EACH PHASE OF PROJECT

ITEM	HAZARD	PREVENTION
Mobilization to site	• Site Security • Slips, Trips, Falls	• Provide identification and spill site information. • Minimize access to and from vessels. • Maintain clear pathways.
Delivery of Site Equipment & Supplies	Back Strains, hand injuries	• Verify before lifting that all equipment is secured. • Do not throw equipment from vessel or dock. Use cranes or lines to lower equipment and tools. • Lift any object over 50lbs with assistance. If in doubt of the weight ask for HELP first. • Lift properly with legs and maintain solid footing.
Towing & Retrieving Boom	Line Breaking, sudden release of energy, struck by. Back / Muscle Strain Slip / Trip / Fall	• Use a minimum of 1 inch poly line. • Inspect all shackles and towing equipment before and after each use. • Ensure that all shackles are “moused” with seizing wire to prevent the shackle pins from working loose. • Be aware of wind and tide effects on the boom while towing. • The vessel operator must assign a deckhand to keep watch on the boom and tow line at all times while under load. • Use the buddy system and use proper ergonomic practices when pulling boom ashore and flaking it into the lined roll-off container. Break the boom into smaller sections so that employees aren’t pulling too much weight. • The area where the boom will be pulled will be covered with polly sheeting, when this gets wet it becomes slippery. Take small steps when walking or pulling boom and wear slip resistant boots and/or disposable boot covers. • Use crane to move sections of boom when possible.
Refueling Equipment	Fire Spills	• A 20lb. Class B fire extinguisher must be in the immediate work area. • Extinguishers must be fully charged and be monthly inspected. • Area in front of extinguishers must be kept clear at all times. • Flammable liquids must be kept in explosion proof containers. • Operator present at all times during fueling. • A functional spill kit in the immediate area • Fueling is to be done in approved areas only

Crane Operations	Crush points Pinch points	• All NRC employees and subcontractors will stand clear of all equipment being raised or lowered by the certified crane operator. Employees shall never be under a suspended load. • Using cribbing to brace the odd shaped hulls of vessels is mandatory to keep the asset from falling. Employees engaged in this operation will wear appropriate gloves and keep their hands, fingers, arms and other body parts clear of all identified pinch points. Each lift will be different and will require different tactics to secure the asset.

WORK PLAN & HAZARDS UNIQUE TO EACH PHASE OF PROJECT

		appropriate measures (e.g. sorbent placement) to minimize risk of leak or spill into the water.
Removal of hazardous materials	Physical & chemical hazards Flammable hazard	• Wear PPE appropriate to task to ensure no physical contact with the hazmat, including eye/face and skin protection • Proper lifting procedures: mechanical, where available, and multi-person • Fire extinguishers will be readily available, e.g. onboard workboats and commercial trucks • Air monitoring will be conducted • Work areas will be kept free of ignition sources, and where flammable atmosphere exists, intrinsically safe tools and equipment used

SAFETY EQUIPMENT REQUIRED

✓	Chem Max I or equivalent	✓	Fire Extinguisher	✓	PID/Four Gas Meter
✓	First Aid Kit	✓	Eye Wash Station	✓	Type III PFDs

TRAINING REQUIREMENTS

✓	HAZWOPER 40	✓	Hazwoper Supervisor	✓	Current 8 Hour Refresher
✓	First Aid /CPR				

MEDICAL SURVEILLANCE PROGRAM

Contaminants	Pre Job Requirement**	Post Job Requirement
Medical Clearance Certificate	Yes	N/A
Respirator Use	Physician's Release to Wear	N/A

**** Not required if these have already been done as part of pre-employment physical examination**

COMMUNICATION PLAN

- Communication Plan: NRC cell phones (each boat, vehicle, and each vessel operator has cell phone) &; primary & alternate radio channels to be established at work start safety meeting.
- Employees will be alerted via radio communication or phone notification from their supervisors or vessel operators should an emergency occur.

DECONTAMINATION

NON-HAZARDOUS WASTE DISPOSAL	• Non-hazardous wastes from vessels or shoreline will be disposed of at a designated dumpster in the waste disposal area.
DECONTAMINATION PLAN	• Decon Plan: personnel will utilize disposable raingear and gloves, and upon removal, place them in proper containers (plastic bags or drums) for subsequent disposal • Xtra Tuff or other rubber or neoprene boots with oil on them will be deconned using water/detergent mix and wipe-down at boot washes located at the decon station. • Vessel Decon Plan: Will be developed, if needed, by Operations and approved by Incident Command.
DISPOSAL PLAN	• Disposable PPE (coveralls, gloves, etc.) will be collected at a designated location, e.g. vessel disembarking site, and placed in visqueen spill bags incidental to placement in dumpsters for temporary storage. • Hazardous materials and waste will be disposed of in accordance with all applicable state, local, or federal regulations. • Transport and disposal of wastes will be in keeping with pertinent regulatory requirements and will be done only at approved disposal sites.

EQUIPMENT FUELING

- All fuel drums and containers are to be kept in secondary containment over-packs at all times.
- The fuel pump must be kept clean and stored to ensure no residue fuels leak on deck.
- Do not spill the fuel or overfill the tanks. Have sorbent pad in place at tank opening.
- Let the engine cool and turn off the electrical sys tems before refueling.
- Use a funnel so gasoline won't spill if a sudden wave tips the vessel (unless fueling nozzle fits into tank opening)

PERSONNEL TRANSFER TO AND FROM VESSELS

- When receiving passengers to response vessels
  - Establish clear communication between the vessel and person boarding.
  - Ensure the person is wearing a PFD.
  - Gauge the wind and tide swell.
  - Once the person is aboard, pull the vessel away so that if the person falls; they fall in the water and in harms way

- When delivering passengers from a response vessel to dock/wharf.
  - Establish clear communication with the person climbing the ladder.
  - Ensure the person is wearing a PFD.
  - Gauge the wind and tide swell at the Terminal wharf.
  - When the person climbing up the ladder is level with the vessel:
    - The vessel operator must look behind the vessel for swells and boat wakes.
    - Instruct the person on the ladder to climb up a few rungs and then approach the ladder slowly avoiding pinch points.

ACCIDENT REPORTING

• **FIRST AID** • **INJURIES REQUIRING MEDICAL TREATMENT** • **VEHICLE ACCIDENT** • **NEAR MISS** • **ENVIRONMENTAL SPILL**	• Employees immediately report all accidents or incidents to their supervisor. • The vessel supervisor will immediately notify the Project Manager and Safety Officer Mark Theriot (985-255-6204) • Safety Officer will provide employee disposition guidelines and coordinate an accident investigation either by himself or Project Manager. • Safety Officer will relay information to the NRC Project Manager and Deputy Incident Commander. • Accident reporting forms are included in the appendix. • Determination will be made regarding the need for post accident drug testing.

HEALTH AND SITE SAFETY PLAN

INTERCONTINENTAL TERMINAL COMANY
2626 TIDAL RD, DEER PARK, TX 77536
MARCH 30, 2019

EMERGENCY MEDICAL TREATMENT AND FIRST AID

TYPE CONTACT	FIRST AID
Eyes	• Flush each eye continuously for 15 minutes. • Tilt head to side to ensure liquid runs onto floor not other eye. • Refer to EMT for evaluation.
Skin	• Remove contaminated clothing immediately. • Wash skin continuously for 15 minutes. • Refer to physician if redness, swelling, or pain persists after washing
Breathing	• Call 911; • Remove to fresh air immediately; • begin CPR until EMT arrives
Ingestion	• Aspiration hazard • Do not induce vomiting • Do not give anything by mouth

EMERGENCY RESPONSE PLAN

ELEMENT	LOCATION, SPECIFICATION OR REASON FOR USE
NEAREST HOSPITALS	To Be Decidied
NEAREST PHONE	All Vessels = cell phones. NRC Supervisors & Safety Officer = cell phones.
FIRST AID KIT	NRC Vehicles / marine vessels
FIRE EXTINGUISHER	NRC Vehicles and in and around work area
EYEWASH STATION	Eye wash stations located on dock in decon area, if none present a portable will be made available. (Will know once site is evaluated)

SAFETY PLAN APPROVAL & REVIEW SIGNATURE

Safety Officer_____ **Date** _____

ACKNOWLEDGMENTS (must be signed by all NRC site personnel/crewmembers)		
Date	**Print Name**	**Signature**

SAFETY PLAN APPROVAL & REVIEW SIGNATURE

Safety Officer_____ **Date** _____

ACKNOWLEDGMENTS (must be signed by all NRC site personnel/crewmembers)		
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SAFETY PLAN APPROVAL & REVIEW SIGNATURE

Safety Officer_____ **Date** _____

ACKNOWLEDGMENTS (must be signed by all NRC site personnel/crewmembers)		
Date	**Print Name**	**Signature**

SAFETY DATA SHEET

Revision: 12 August 2015 SDS No.: YUB600(ENG) Version number: 3

SECTION 1: Identification of the substance/mixture and company/undertaking

1.1 Product identifier

YUBASE 6
REACH registration number
01-2119484627-25-0042

1.2 Relevant identified uses of the substance or mixture and uses advised against

Mineral base oil.
Uses advised against: not available.

1.3 Details of the supplier of the safety data sheet

SK Lubricants Co. Ltd.,
26 Jong-ro Jongno-gu
Seoul
110-728, South Korea

Phone: +82 2 2121 7755
Email: Andy.Yoon@sk.com

SK Lubricants Americas
1300 Post Oak Blvd., Suite 450
Houston, TX 77056

Tel: 713-341-5844
Mobile: 713-397-1663
Sean Seo: oksh@sk.com

Local Chemical Emergency Contact

Spill Leak Fire Exposure or Accident
Call CHEMTREC Day or Night
DOMESTIC NORT AMERICA 800-424-9300
INTERNATIONAL, CALL +1-703-527-3887 (collect calls accepted)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008	Not classified
Classification according to Directive 1999/45/EC	Not classified

2.2 Label elements

Signal word	Not applicable
Hazard statements	Not applicable
Precautionary statements	
prevention	None.
response	None.
storage	None.
disposal	Dispose of contents/container to recycling or incineration in accordance with local/national regulation.
Supplemental information	None.

2.3 Other hazards Not available.

SAFETY DATA SHEET

SECTION 3: Composition/information on ingredients

3.1 Substances [a]

Declarable components	*Conc. (wt%)*	*EC No.*	*CAS No.*
Distillates (petroleum) hydrotreated heavy paraffinic [a]	100	265-157-1	64742-54-7
Other components			
Not available			

[a] The DMSO extract by IP 346 of this substance is less than 3% (typical 0.2% with maximum 0.5%). Consequently it is not classified as a carcinogen.

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation

Inhalation at ambient temperature is unlikely because of the low vapour pressure of the substance.

In case of symptoms arising from inhalation of fumes, mists or vapour, remove casualty to a quiet and well ventilated place if safe to do so.

If the casualty is unconscious and:

- Not breathing: ensure that there is no obstruction to breathing and give artificial respiration by trained personnel. If necessary, give external cardiac massage and obtain medical assistance.

- Breathing: place in recovery position. Administer oxygen if necessary. Obtain medical assistance if breathing remains difficult.

Skin

Remove contaminated clothing and footwear, and dispose of safely.

Wash affected area with soap and water.

Seek medical attention if skin irritation, swelling or redness develops and persists.

When using high-pressure equipment, injection of product can occur. If high-pressure injuries occur, immediately seek professional medical attention. Do not wait for symptoms to develop.

For minor thermal burns: cool the burn. Hold the burned area under cold running water for at least five minutes, or until the pain subsides. However, body hypothermia must be avoided.

Do not put ice on the burn. Remove non-sticking garments carefully. DO NOT attempt to remove portions of clothing glued to burnt skin but cut round them.

Seek medical attention in all cases of serious burns

Eye

May cause burn in case of contact with product at high temperature.

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.

If irritation, blurred vision or swelling occurs and persists, obtain medical attention.

If hot product is splashed into the eye, it should be cooled immediately to dissipate heat, under cold running water. Immediately seek specialist

medical assessment and treatment for the casualty.

Ingestion

Always assume that aspiration has occurred. Seek professional medical attention or send the casualty to a hospital. Do not wait for symptoms to develop.

Product is as an aspiration hazard, and swallowing may lead to lung damage. Even small amounts of product aspirated into the lung require medical evaluation and treatment. **Do not** induce vomiting. **Do not** give anything to drink.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation: irritation of the respiratory tract due to excess fumes, mists or vapour exposure.

Skin: dry skin or irritation may arise in case of repeated or prolonged exposure. May cause burns in case of contact with product at high temperature.

Eye: slight irritation (unspecific).

Ingestion: for acute toxicity, few or no symptoms expected, e.g. nausea and diarrhoea. However, product is an aspiration hazard. Aspiration of low viscosity liquids into the lungs is a serious, potentially fatal, event. Aspiration may be recognized from the history of events, a smell of hydrocarbons on the breath, signs of vomiting or symptoms such as choking or coughing.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptoms as they occur.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable

- Foam (specifically trained personnel only).
- Water fog (specifically trained personnel only).
- Dry chemical powder.
- Carbon dioxide.
- Other inert gases (subject to regulations).
- Sand or earth.

Unsuitable

Do not use direct water jets on the burning product as they could cause splattering and spread the fire.

Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

5.2 Special hazards arising from the substance or mixture

Not classified as flammable, but will burn if involved in a fire.

During a fire, incomplete combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates and gases, including carbon monoxide and unidentified organic and inorganic compounds.

5.3 Advice for firefighters

Remove containers from fire or cool them with water spray.

In case of a large fire or in confined or poorly ventilated spaces wear full fire resistant protective clothing and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Stop or contain leak at the source if safe to do so. Avoid direct contact with released material. Stay upwind.

Keep unauthorised personnel away from the area of spillage. Alert emergency personnel.

Except in case of small spillages, the feasibility of any actions should always be assessed and advised, if possible, by a trained, competent person in charge of managing the emergency.

It is recommended to eliminate all ignition sources if safe to do so (e.g. electricity, sparks, fires, flares).

If required, notify relevant authorities according to all applicable regulations.

Personal Protection Equipment for Emergency Responders:

Small spillages: normal antistatic working clothes are usually adequate. Large spillages: full body suit of chemically resistant and antistatic material.

Work gloves providing adequate chemical resistance, specifically to aromatic hydrocarbons. Note: gloves made of PVA are not water-resistant, and are not suitable for emergency use.

Work helmet. Antistatic non-skid safety shoes or boots.

Goggles or face shield, if splashes or contact with eyes is possible or anticipated.

Respiratory protection will be necessary only in special cases (e.g. formation of mists). A half or full-face respirator with combined dust/organic vapour filter(s), or a self-contained breathing apparatus (SCBA) can be used according to the extent of spill and predictable amount of exposure. If the situation cannot be completely assessed, or if an oxygen deficiency is possible, only SCBAs should be used.

6.2 Environmental precautions

Prevent product from entering sewers, rivers, waterways or other bodies of water.

6.3 Methods and material for containment and cleaning up

Land Spillage:

If necessary dike the product with dry earth, sand or similar non-combustible materials.

Large spillages may be cautiously covered with foam, if available, to limit fire risk. Do not use direct jets.

When inside buildings or confined space, ensure adequate ventilation.

Absorb spilled product with suitable non-combustible materials.

Collect free product by suitable means. Transfer collected product and other contaminated materials to suitable tanks or containers for recycle, recovery or safe disposal.

In case of soil contamination, remove contaminated soil for remediation or disposal according to local regulations.

Spillages in Water or at Sea:

In case of small spillages in closed waters (i.e. ports), contain product with floating barriers or other equipment. Collect spilled product by absorbing with specific floating absorbents.

If possible, large spillages in open waters should be contained with

floating barriers or other mechanical means. If this not possible, control the spreading of the spillage, and collect the product by skimming or other suitable mechanical means.

The use of dispersants should be advised by an expert, and, if required, approved by local authorities.

Collect recovered product and other contaminated materials in suitable tanks or containers for recovery or safe disposal.

Additional Information:

Recommended measures are based on the most likely spillage scenarios for this material; however, local conditions (wind, air temperature, wave/current direction and speed) may significantly influence the choice of appropriate actions. For this reason, local experts should be consulted when necessary. Local regulations may also prescribe or limit actions to be taken.

6.4 Reference to other sections

For recommended personal protective equipment, see Section 8.

For disposal considerations, see Section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Ensure that all relevant regulations regarding handling and storage facilities of combustible products are followed.

It is recommended to keep away from sparks/open flames/hot surfaces. – No smoking. Take precautionary measures against static electricity.

Avoid splash filling of bulk volumes when handling hot liquid product.

Use and store only outdoors or in a well-ventilated area.

Avoid contact with skin. Avoid breathing fume/mist.

Use personal protective equipment as required.

Prevent the risk of slipping.

Avoid release to the environment.

7.2 Conditions for safe storage, including any incompatibilities

Storage area layout, tank design, equipment and operating procedures must comply with the relevant European, national or local legislation.

Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills.

Cleaning, inspection and maintenance of internal structure of storage tanks must be done only by properly equipped and qualified personnel as defined by national, local or company regulations.

Store separately from oxidizing agents.

Recommended materials: for containers, or container linings use mild steel, or stainless steel.

Unsuitable materials: some synthetic materials may be unsuitable for containers or container linings, depending on the material specification and intended use. Compatibility should be checked with the manufacturer.

If the product is supplied in containers:

- Keep only in the original container or in a suitable container for this kind of product.
- Keep containers tightly closed and properly labelled.
- Empty containers may contain combustible product residues. Do not

weld, solder, drill, cut or perform similar operations unless they have been properly cleaned.

Hygiene Measures:

Ensure that proper housekeeping measures are in place.

Contaminated materials should not be allowed to accumulate in the workplaces and should never be kept inside the pockets.

Keep away from food and beverages.

Do not eat, drink or smoke when using this product.

Wash hands thoroughly after handling.

Change contaminated clothes at the end of working shift.

Load/unload temperature: ambient.

Storage temperature: ambient.

7.3 Specific end use(s) Not available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

EU limit values	None.
UK limit values	None.
Monitoring procedure	Not applicable.
Other: human health (DNELs, DMELs)	Not available.
Other: environmental (PNEC)	Distillates (petroleum), hydrotreated heavy paraffinic: PNEC: oral, 9.33 mg/kg food.

8.2 Exposure controls

Engineering controls	Good general ventilation is recommended for handling the product. For processing, where mist or vapour might be formed, local exhaust ventilation or use in a closed system is recommended. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present.
Personal protective equipment	The need for personal protective equipment should be based on a workplace risk assessment for the particular use. No special respiratory protection is normally required. Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Normal industrial eye protection practices should be employed. Wear suitable gloves (nitrile gloves are recommended) to avoid direct skin contact. PPE should be to national standards. Consult manufacturers concerning breakthrough times.
Environmental exposure controls	Not available.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	Water white liquid
Odour	Characteristic, mineral oil
Odour threshold	Not established
pH	Not applicable
Melting/freezing point	Not established
Initial boiling point/range	300–580 °C
Flash point	236 °C (Cleveland open cup)
Evaporation rate	Not established
Flammability (solid, gas)	Not applicable
Flamm. or expl. limits	Not established
Vapour pressure	<0.01 kPa
Vapour density	>5 (air = 1)
Relative density	0.842 (water = 1)
Solubilities	Water: negligible
Partition coeff. (K_{ow})	Expected to be >7
Auto-ignition temp.	> 290 °C
Decomposition temp.	Not established
Viscosity	37 cSt at 40 °C
Explosive properties	Not available
Oxidising properties	Not available

9.2 Other information Not available

SECTION 10: Stability and reactivity

10.1 Reactivity Not available.

10.2 Chemical stability Stable under normal temperature and pressure.

10.3 Possibility of hazardous reactions No hazardous polymerisation.

10.4 Conditions to avoid Extreme heat.

10.5 Incompatible materials Strong oxidizing agents.

10.6 Hazardous decomposition products Incomplete combustion gives toxic gas mixture, including carbon monoxide.

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity	Based on available data, the classification criteria are not met. LD_{50} (oral), > 5000 mg/kg; LC_{50} (inhalation), > 5.0 mg/L; LD_{50} (dermal, rat), > 2000 mg/kg (practically non-toxic).
Skin corrosion/irritation	Only weakly irritating or non-irritating to the skin of rabbits and humans.
Serious eye damage/irritation	Practically non-irritating.
Respiratory or skin sensitisation	Respiratory: not expected to cause respiratory sensitization. Skin: based on available data, the classification criteria are not met.
Germ cell mutagenicity	This substance was found to be non-mutagenic.
Carcinogenicity	Based on available data, the classification criteria are not met.
Reproductive toxicity	Based on available data, the classification criteria are not met. Reproductive toxicity dermal NOAEL (development) > 2000 mg/kg. This substance showed no effects on reproductive parameters.
STOT-single exposure	Not classified due to lack of data.
STOT-repeated exposure	Based on available data, the classification criteria are not met. Sub-chronic repeat dose, dermal: NOAEL 1000 mg/kg. Sub-chronic repeat dose, inhalation: NOAEL (local effects) > 220 mg/m^3 and NOAEL (systemic effects) > 980 mg/m^3.
Aspiration hazard	Not meet the criteria for classification.

SECTION 12: Ecological information

12.1 Toxicity	Product is not classified as harmful to aquatic organisms. Acute aquatic invertebrate EL_{50} > 10 000mg/L. Acute aquatic algae NOEL > 100 mg/L. Acute fish LL_{50} > 100 mg/L. Long-term invertebrate NOEL 10mg/L. Long-term fish NOEL 10mg/L.
12.2 Persistence and degradability	Not readily biodegradable, but inherently biodegradable (ca. 30% degradation in 28 d (method OECD 301 F).
12.3 Bioaccumulative potential	Not available
12.4 Mobility in soil	Not available.
12.5 Results of PBT and vPvB assessment	Not available.
12.6 Other adverse effects	The product is a water-insoluble oil, and may form a sheen or film on water.

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Incineration or recycling is recommended for disposal of this product. This product is not suitable for landfill or disposal via the drains. Disposal must be in accordance with current national and local regulations. Chemical residues generally count as special waste. General EU requirements are given in Directive 2008/98/EC, including procedures for the disposal of waste oils.

Wastes of this product are covered in the European Waste Catalogue, suggested code 13 02 05, mineral-based non-chlorinated, engine, gear and lubricating oils.

The hazards of the waste may differ from that of the product, and it is the responsibility of the waste generator to identify hazards and dispose wastes in compliance with applicable regulations.

SECTION 14: Transport information

14.1 UN Number	Not classified as dangerous goods for transport.
14.2 UN proper shipping name	Not applicable.
14.3 Transport hazard class(es)	Not applicable.
14.4 Packing group	Not applicable.
14.5 Environmental hazards	Not classified as marine pollutant/environmentally hazardous.
14.6 Special precautions for user	Not available.
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture	*UK*: Workplace Exposure Limits EH40/2005, with 2007 supplement, Health and Safety Executive; Control of Substances Hazardous to Health Regulations 2002 (COSHH), as amended.
15.2 Chemical safety assessment	Not available.

SECTION 16: Other information

Revisions	This SDS is the first version in EU format, using classification according to the CLP Regulation.
Abbreviations	DNEL, derived no-effect level; DMEL, derived minimum effect level;

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	observed-adverse-effect level; NOEL, no-observed-effect level; OECD, Organisation for Economic Co-operation and Development; PBT, persistent, bioaccumulative, and toxic; vPvB, very persistent, very bioaccumulative.
References	Annex VI of Regulation 1272/2008 on *Harmonised Classification and Labelling for Certain Hazardous Substances* (CLP Regulation). Information on Registered Substances; Chemical Substance Search; European Chemicals Agency (ECHA), available at the ECHA website: http://echa.europa.eu. Supplier safety data sheet.
Basis of classification	The recommendations presented in this Safety Data Sheet were obtained from actual test data when available, comparison with similar products, component information from suppliers and from recognized codes of good practice.

Disclaimer:

The data and recommendation presented herein are based on our research and the research of others, and are believed to be accurate. No guarantee of their accuracy is made, however, and the products discussed are distributed without warranty, express or implied, and the person receiving them small make his own determination of the suitability thereof for his particular purpose.

Received 11/7/14

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SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **AMERICAS SN 115 DO**
Product Description: Severely Treated Base Oils
Product Code: 3010101010T5, 710194-00, 97Z990
Intended Use: Base oil

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to regulatory guidelines (see (M)SDS Section 15).

CLASSIFICATION:

Aspiration toxicant: Category 1.

LABEL:
Pictogram:

Signal Word: Danger

Hazard Statements:
H304: May be fatal if swallowed and enters airways.

Precautionary Statements:
P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P331: Do NOT induce vomiting.P405: Store locked up.P501: Dispose of contents and container in accordance with local regulations.

Other hazard information:

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HAZARD NOT OTHERWISE CLASSIFIED (HNOC): None as defined under 29 CFR 1900.1200.

PHYSICAL / CHEMICAL HAZARDS

No significant hazards.

HEALTH HAZARDS

High-pressure injection under skin may cause serious damage. Excessive exposure may result in eye, skin, or respiratory irritation.

ENVIRONMENTAL HAZARDS

No significant hazards.

NFPA Hazard ID:	Health:	1	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	1	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

Hazardous Substance(s) or Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
SEVERELY HYDROTREATED HEAVY PARAFFINIC DISTILLATE	64742-54-7	20 - < 30%	H304
SOLVENT DEWAXED HEAVY PARAFFINIC DISTILLATE	64742-65-0	20 - < 30%	H304

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent

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of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: 190°C (374°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: respiratory protection will be necessary only in special

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cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Substance Name	Form	Limit / Standard	NOTE	Source

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SEVERELY HYDROTREATED HEAVY PARAFFINIC DISTILLATE	Inhalable fraction.	TWA	5 mg/m3		N/A	ACGIH
SEVERELY HYDROTREATED HEAVY PARAFFINIC DISTILLATE	Mist.	TWA	5 mg/m3		N/A	ACGIH
SOLVENT DEWAXED HEAVY PARAFFINIC DISTILLATE	Mist.	TWA	5 mg/m3		N/A	OSHA Z1
SOLVENT DEWAXED HEAVY PARAFFINIC DISTILLATE		TWA	2000 mg/m3	500 ppm	N/A	OSHA Z1
SOLVENT DEWAXED HEAVY PARAFFINIC DISTILLATE	Mist.	TWA	5 mg/m3		N/A	ACGIH

Exposure limits/standards for materials that can be formed when handling this product: When mists/aerosols can occur the following are recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

No biological limits allocated.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good

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industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Color: Amber
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.86
Flammability (Solid, Gas): N/A
Flash Point [Method]: 190°C (374°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316°C (600°F) [Estimated]
Decomposition Temperature: N/D
Vapor Density (Air = 1): > 2 at 101 kPa [Estimated]
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 20.2 cSt (20.2 mm2/sec) at 40 °C | 4.1 cSt (4.1 mm2/sec) at 100°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -18°C (-1°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: See sub-sections below.

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STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

INFORMATION ON TOXICOLOGICAL EFFECTS

Hazard Class	Conclusion / Remarks
Inhalation	
Acute Toxicity: (Rat) 4 hour(s) LC50 > 5000 mg/m3 (Aerosol)	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 403
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Acute Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 401
Skin	
Acute Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 402
Skin Corrosion/Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 404
Eye	
Serious Eye Damage/Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 405
Sensitization	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: Data available.	Not expected to be a skin sensitizer. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 406
Aspiration: Data available.	May be fatal if swallowed and enters airways. Based on physico-chemical properties of the material.
Germ Cell Mutagenicity: Data available.	Not expected to be a germ cell mutagen. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 471 473 474 476
Carcinogenicity: Data available.	Not expected to cause cancer. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 451 453
Reproductive Toxicity: Data available.	Not expected to be a reproductive toxicant. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 414 421
Lactation: No end point data for material.	Not expected to cause harm to breast-fed children.
Specific Target Organ Toxicity (STOT)	
Single Exposure: No end point data for material.	Not expected to cause organ damage from a single exposure.
Repeated Exposure: Data available.	Not expected to cause organ damage from prolonged or repeated exposure. Based on test data for structurally similar materials.

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	Test(s) equivalent or similar to OECD Guideline 408 410 411 412 453

OTHER INFORMATION

For the product itself:

Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.
Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Material -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.
Material -- Low potential to migrate through soil.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Material -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

ECOLOGICAL DATA

Ecotoxicity

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Test	Duration	Organism Type	Test Results
Aquatic - Acute Toxicity	96 hour(s)	Pimephales promelas	LL0 100 mg/l: data for similar materials
Aquatic - Acute Toxicity	48 hour(s)	Daphnia magna	EL0 1000 - 10000 mg/l: data for similar materials
Aquatic - Acute Toxicity	72 hour(s)	Pseudokirchneriella subcapitata	EL0 100 mg/l: data for similar materials
Aquatic - Chronic Toxicity	72 hour(s)	Pseudokirchneriella subcapitata	NOELR 100 mg/l: data for similar materials
Aquatic - Chronic Toxicity	21 day(s)	Daphnia magna	NOELR 10 - 1000 mg/l: data for similar materials

Persistence, Degradability and Bioaccumulation Potential

Media	Test Type	Duration	Test Results
Water	Ready Biodegradability	28 day(s)	Percent Degraded < 60 : similar material

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

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LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

Marine Pollutant: No

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: This material is considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements: AICS, DSL, ENCS, IECSC, KECI, PICCS, TSCA

EPCRA SECTION 302: This material contains no extremely hazardous substances.

CERCLA: This material is not subject to any special reporting under the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Contact local authorities to determine if other reporting requirements apply.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: Immediate Health.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

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KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):
H304: May be fatal if swallowed and enters airways; Aspiration, Cat 1

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Updates made in accordance with implementation of GHS requirements.

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DGN: 7041589XUS (1008821)

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INTERGULF CORPORATION

SAFETY DATA SHEET

1. IDENTIFICATION

1.1 Product identifier

Product Name: Gasoline Blendstock
CAS #: Mixture

1.2 Recommended use of the chemical and restrictions on use

Uses: Fuel
Restrictions: No data available.

1.3 Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Intergulf Corporation
10020 Bayport Blvd.
Pasadena, TX 77507 USA
281-474-4210 Fax: 281-474-4226

1.4 Emergency telephone number

800-424-9300 24 HR CHEMTREC

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to 29 CFR §1910.1200 (d)

Flammable liquids (Category 2)
Carcinogenic toxicity (Category 1A)
Germ cell mutagenicity (Category 1B)
Reproductive toxicity (Category 2)
Skin irritation (Category 2)
Eye irritation (Category 2)
Specific target organ toxicity - repeat exposure (Category 1)
Specific target organ toxicity - single exposure (Category 3)
Aspiration hazard (Category 1)

2.2 Label elements

Labeling according to 29 CFR §1910.1200 (f)

Symbol(s):

Signal word: **Danger**

Hazard statement(s):

Highly flammable liquid and vapor.
May cause cancer.
May cause genetic defects.
Suspected of damaging fertility or the unborn child.
Causes damage to organs.
Causes skin irritation.
Causes eye irritation.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.
Very toxic to aquatic life with long lasting effects.

Precautionary statement(s):

Prevention:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment. Use explosion-proof electrical/ ventilating/ lighting/ equipment.
Take precautionary measures against static discharge. Use only non-sparking tools.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Do no eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

Response:

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

Rinse mouth. Do NOT induce vomiting.

IF exposed or concerned: Get medical advice/attention.

IF ON SKIN (or hair): Remove immediately all contaminated clothing. Wash skin with plenty of soap and water.

If skin irritation occurs: Get medical advice/attention.

Wash contaminated clothing before reuse.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If eye irritation persists: Get medical advice/attention.

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Get medical advice/attention if you feel unwell.

Specific treatment (see First Aid Measures on this label).

In case of fire: Use dry chemical, carbon dioxide, foam, or water fog for extinction.

Storage:

Store in a well-ventilated place. Keep container tightly closed. Keep cool.

Store locked up.

Disposal:

Dispose of contents/container in accordance local/regional/national/international regulations. See Section 13.

2.3 Other hazards None

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Chemical Name	CAS #	EINECS	Amount
ALKANES, C>8, LINEAR, BRANCHED, OR CYCLIC	68666-81-3, 73138-29-1, 74664-93-0, etc.	N.L.	40-90%
ALKENES, C>8, LINEAR, BRANCHED, OR CYCLIC	68411-00-7, etc.	270-095-3	0-40%
AROMATIC HYDROCARBONS, C9-C17	68333-88-0, etc.	269-797-2	0-40%
TOLUENE	108-88-3	203-625-9	0-30%
XYLENE	1330-20-7	215-535-7	0-30%
HEXANE	110-54-3	203-777-6	0-20%
BENZENE	71-43-2	200-753-7	0-10%
ETHYLBENZENE	100-41-4	202-849-4	0-10%
CUMENE	98-82-8	202-704-5	0-10%
DICYLCOPENTADIENE	77-73-6	201-052-9	0-10%
NAPHTHALENE	91-20-3	202-049-5	0-10%
ALCOHOLS, C5-C12	VARIES-ALCOHOLS C5-C12	N.L.	0-10%

N.L. - Not listed.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

IF exposed or concerned: Get medical advice/attention.

Show this this safety data sheet to the doctor in attendance.

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

If breathing is difficult, give oxygen. Refer for medical attention.

Skin Contact

IF ON SKIN (or hair): Remove immediately all contaminated clothing. Wash skin with plenty of soap and water.

Get medical advice/attention.

Eye Contact

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Get medical advice/attention.

Ingestion

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

Rest. Seek immediate medical attention.

Advice to Physician

Individuals with a glucose-6-phosphate dihydrogenase deficiency are hypersensitive to the effects of naphthalene.

4.2 Most important symptoms and effects, both acute and delayed

Acute

Symptoms of exposure to this product may include the following:

- Irritation of the eyes, skin, mucous membrane and respiratory tract.
- Nausea, headache, vomiting, diaphoresis (profuse sweating), hematuria (blood in urine), fever.
- Effects on the liver and kidneys.
- Visual disturbances and cataracts.
- Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
- Breathing of high vapor concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea, and loss of coordination.
- If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure.

Delayed

Long term or repeated exposure to this material may have effects on the central nervous system and defat the skin.

Auditory system effects may include temporary hearing loss and/or ringing in the ears.

Visual system disturbances my be evidenced by decreases in the ability to discriminate between colors.

Damage to blood-forming organs may be evidenced by fatigue and anemia (RBC) and decreased resistance to infection, and/or excessive bruising and bleeding (platelet effect).

Immunotoxicity may be evidenced by decreased resistance to infection.

Some symptoms can be either acute or delayed or both. See above.

4.3 Indication of any immediate medical attention and special treatment needed

Potential for chemical pneumonitis. Consider: gastric lavage with protected airway, administration of activated charcoal.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing Media

In case of fire: Use dry chemical, foam, or carbon dioxide for extinction.

Use water spray to cool fire exposed containers.

Unsuitable Extinguishing Media

Jet water spray may cause frothing and may spread the fire to a larger area.

5.2 Special hazards arising from the substance or mixture

Produces oxides of carbon upon combustion.

5.3 Advice for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand (OSHA/NIOSH approved or equivalent) and full protective gear.

5.4 Further information

NFPA Rating:

Health:	2
Flammability:	3
Reactivity:	0

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Protective Measures

Evacuate danger area.

Isolate hazard area and deny entry to unnecessary or unprotected personnel. Remove all possible sources of ignition in the surrounding area.

Personal protection: filter respirator for organic gases and vapors or SCBA.

6.2 Environmental precautions

Do NOT wash away into sewer. Do NOT let this chemical enter the environment

Use appropriate containment of product and fire fighting water to avoid environmental contamination. Prevent from spreading or entering drains, ditches, or rivers by using sand, earth, or other appropriate barriers.

Notify authorities if any exposure to the general public or environment occurs or is likely to occur. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Clean up with non-sparking tools and return to original container.

Carefully collect the remaining and remove to safe place.

6.4 Reference to other sections

Refer to Section 8 for personal protection advice and Section 13 for disposal information.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment. Use explosion-proof electrical/ ventilating/ lighting/ equipment. Take precautionary measures against static discharge. Use only non-sparking tools.

Avoid breathing vapors or mists. Avoid contact with eyes or skin.

Wear protective gloves/protective clothing/eye protection/face protection.

Do no eat, drink or smoke when using this product.

Wash thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities

Store in a well-ventilated place. Keep container tightly closed.

Store separated from strong oxidants, strong acids, food, and feedstuffs. Store in an area without a drain or sewer access.

May react with strong oxidants and strong acids. Benzene reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Naphthalene reacts violently with dinitrogen pentaoxide, chromium trioxide, aluminum chloride, and benzoyl chloride.

Store locked up.

Ensure that all local regulations regarding handling and storage facilities are followed.

7.3 Specific end use(s)

No data available.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Permissible Exposure Limits

Compound Name	CAS #	Source 1	Source 2	BEI/Skin Notation
TOLUENE	108-88-3	ACGIH TWA: 20 ppm	OSHA TWA: 200 ppm	BEI: Toluene: 0.02 mg/L in blood [prior to last shift of workweek]; Toluene: 0.03 mg/L in urine [end of shift]; o-Cresol: 0.03mg/g creatinine in urine [end of shift].
XYLENE	1330-20-7	ACGIH TWA: 100 ppm	OSHA TWA: 100 ppm	BEI: Methylhippuric acids: 1.5 g/g creatinine in urine [end of shift]
HEXANE	110-54-3	ACGIH TWA: 50 ppm	OSHA TWA: 500 ppm	BEI: 2,5-Hexanedion: 0.4 mg/L in urine [end of shift]. May be absorbed through the skin!
BENZENE	71-43-2	ACGIH TWA: 0.5 ppm; STEL: 2.5 ppm	OSHA TWA: 1 ppm; STEL: 5 ppm	BEI: S-Phenylmercapturic acid: 25 ug/g creatinine in urine [end of shift]; t,t-Mucconic acid: 500 ug/g creatinine in urine [end of shift]. Can be absorbed through the skin!
ETHYLBENZENE	100-41-4	ACGIH TWA: 100 ppm	ACGIH STEL: 125 ppm	BEI: Mandelic acid and Phenylglyoxylic acid (sum): 0.7 g/g creatinine in urine [end of shift at end of workweek]
CUMENE	98-82-8	ACGIH TWA: 50 ppm	N.D.	N.D.
DICYLCOPENTADIENE	77-73-6	ACGIH TWA: 5 ppm	N.D	N.D
NAPHTHALENE	91-20-3	ACGIH TWA: 10 ppm; ACGIH STEL: 15 ppm	OSHA TWA: 10 ppm	May be absorbed through the skin!

N.D. - No data available

ACGIH: American Conference of Governmental Industrial Hygienists
OSHA: U.S. Occupational Health and Safety Administration
TWA: Time weighted average
STEL: Short Term Exposure Limit
BEI: Biological Exposure Indices

8.2 Exposure Controls

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures may include the following:

Use sealed systems as far as possible. Adequate explosion-proof ventilation to control airborne concentrations below the exposure limits. Local exhaust ventilation is recommended.

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

8.3 Personal Protective Equipment

Use personal protective equipment as required.

All personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers for more information.

Respiratory Protection

Use only with adequate ventilation. If engineering controls do not maintain airborne concentrations at a level which is adequate to protect worker health, an approved respirator should be used.

When there is potential for airborne exposures in excess of applicable limits, wear NIOSH/MSHA approved respiratory protection. Contact respirator supplier for specific recommendations.

For situations where high concentrations of vapors may be present, use an approved supplied air respirator operated in positive pressure mode.

Hand Protection

Where hand contact with this material may occur, use gloves that meet applicable standards.

Specific glove information is provided based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending upon the specific use conditions.

Contact glove manufacturer for advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves.

Eye Protection

Chemical splash goggles which meet the national standards should be used when handling this material.

Skin Protection

Chemical resistant suit including boots and gloves should be used when handling this material.

Specific Hygiene Measures

Do not eat, drink, or smoke when handling this material. Wash hands thoroughly after handling.

Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned.

Monitoring Methods

Monitoring of the vapor concentrations of chemicals in the workplace may be required to confirm compliance with OEL and adequacy of exposure controls.

Sources for recommended air monitoring methods include:

USA: National Institute of Occupational Safety and Health (NIOSH): Manual of Analytical Methods, http://www.cdc.gov/niosh/nmam/nmammenu.html.

USA: Occupational Safety and Health Administration (OSHA): Sampling and Analytical Methods, http://osha.gov/dts/sltc/methods/toc.html.

Environmental Exposure Controls

Local guidelines for emissions limits for volatile substances must be observed for the discharge of exhaust air containing vapors.

See Sections 6, 7,12, and 13 for more information on environmental exposure controls.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

(a) Appearance	Form:	Liquid	(at ambient conditions)			
	Color:	Clear and bright; light yellow				
(b) Odor		Petroleum				
(c) Odor threshold		300	ppm			
(d) pH		5 - 9				
(e) Melting/freezing point		< -10	°F	-23.3	°C	
(f) Initial boiling point and boiling range		80 - 425	°F	27 - 218	°C	ASTM D86
(g) Flash point		< -10	°F	-23.3	°C	PMCC
(h) Evaporation rate		10 - 11		(Butyl acetate = 1)		
(i) Flammability (solid, gas)		No data available.				
(j) Upper/lower flammability or explosive limits		1.4 - 7.4		volume % in air		
(k) Vapor pressure		<10	psia	RVP: ASTM D323		
(l) Vapor density		4		(Air = 1)		
(m) Relative density		0.7389 - 0.8251		(Water = 1)		
(n) Solubility (ies)		Slight				
(o) Partition coefficient: n-octanol/water		>100				
(p) Auto-ignition temperature		520	°F	271	°C	
(q) Decomposition temperature		>760	°F	>404.4	°C	
(r) Viscosity		0.5 - 1.0	cSt	at 75 °F		

9.2 Other information

No data available.

10. STABILITY AND REACTIVITY

10.1 Reactivity

May react with strong oxidants and strong acids.

10.2 Chemical Stability

The chemical is expected to be stable in normal operating conditions.

Hazardous polymerization will not occur.

10.3 Possibility of hazardous reactions

May react with strong oxidants and strong acids. Benzene reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Naphthalene reacts violently with dinitrogen pentaoxide, chromium trioxide, aluminum chloride, and benzoyl chloride.

Cumene and Dicyclopentadiene can form hazardous peroxides.

10.4 Conditions to Avoid

Avoid heat, sparks, open flames, and other sources of ignition.

10.5 Incompatible materials

Strong oxidizing agents and strong acids. May attack plastic and rubber.

10.6 Hazardous Decomposition Products

On combustion, this material forms irritating and toxic gases.

11. TOXICOLOGICAL INFORMATION

11.1 Likely routes of exposure

This material can be absorbed into the body by inhalation, through the skin, and by ingestion.

11.2 Signs and symptoms of exposure

Symptoms of exposure to this compound may include the following:

Irritation of the eyes, skin, mucous membrane and respiratory tract.

Nausea, headache, vomiting, diaphoresis (profuse sweating), hematuria (blood in urine), fever.

Effects on the liver and kidneys.

Visual disturbances and cataracts.

11.3 Delayed and immediate effects/Chronic effects from short- and long-term exposure

Eye

This material is not expected to cause serious/permanent eye damage but irritation may occur.

Skin

This material is not expected to cause serious/permanent skin damage, but irritation may occur. May be absorbed through the skin!

Inhalation

Inhalation of this material may cause cough, sore throat, headache, weakness, ataxia, dizziness, drowsiness, nausea, vomiting, sweating, confusion, jaundice, and dark urine.

Ingestion

Ingestion of this material may cause: burning sensation in the stomach and chest, abdominal pain, diarrhea, nausea, convulsions, unconsciousness, headache, weakness, nausea, vomiting, sweating, confusion, jaundice, and dark urine.

Chronic effects

Long term or repeated exposure to this material may have effects on the blood, resulting in chronic hemolytic anemia. The substance may have effects on the eyes, resulting in the development of cataracts.

Long term or repeated exposure to this material may defat the skin leading to dermatitis, dry skin, and cracking.

Subchronic effects

The substance may cause effects on the blood, resulting in lesions of blood cells (hemolysis) . The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated.

This substance and vapor is irritating to the eyes, skin, and respiratory tract. The substance may cause effects on the central nervous system at high concentrations resulting in narcosis.

Respiratory or skin sensitization
Naphthalene can cause allergic skin reactions.

Germ cell mutagenicity
Benzene may cause heritable genetic damage.

Reproductive toxicity
Affects reproductive system in animals at doses which produce other toxic effects. (n-Hexane). Animal tests suggest that this material may cause toxicity to human reproduction or development. (Toluene, Xylene).

Specific target organ toxicity - single exposure
Respiratory System: Exposure to this material may cause lung irritation.

Central Nervous System (CNS): Exposure to this material can cause effects on the central nervous system including dizziness, drowsiness, and narcosis.

Specific target organ toxicity - repeat exposure
Auditory System: Prolonged or repeated exposure to toluene or xylene in high concentrations may enhance hearing damage caused by exposure to noise.

Vision/Visual System: May cause cataracts (Naphthalene). Toluene may cause decreased color perception. These subtle changes have not been found to lead to functional color deficits.

Blood: May cause hemolysis of red blood cells and/or anemia. (Benzene). May have effects on the blood resulting in chronic hemolytic anemia. (Naphthalene)

Blood-forming organs: Repeated exposure affects the bone marrow. (Benzene).

Immune System: Animal studies suggest immunotoxicity. (Benzene)

Peripheral Nervous System: Repeated exposure causes peripheral neuropathy in animals. (n-Hexane)

Liver/Kidneys: Exposure to Ethylbenzene may have effects on the kidneys and liver, resulting in impaired functions.

Skin: Exposure to this material may defat the skin leading to dryness, cracking, or dermatitis.

Aspiration hazard
Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Potential health effects
Exposure to this compound may cause irritation of the eyes, skin, mucous membrane and respiratory tract. It may cause visual disturbances. lens opacities. and corneal injury.

The substance may cause effects on the kidneys and liver, resulting in impaired function.

Target organ(s): Blood/blood systems. Visual system. Hearing system. Skin. Kidneys. Liver. Central nervous system (CNS).

11.4 Acute Toxicity Estimates

Compound Name	CAS #	TEST - SPECIES - RESULT
TOLUENE	108-88-3	Oral LD50 - Rat: 2600 mg/kg; Dermal LD50 - Rabbit: 12,200 mg/kg; Inhalation LC50 - Mouse: 400 ppm/4 hours
XYLENE	1330-20-7	Oral LD50 - Rat: >3500 mg/kg; Dermal LD50 - Rabbit: >43 g/kg; Inhalation LC50 - Rat: 6350 ppm/4 hr.
HEXANE	110-54-3	Oral LD50 - Rat: 25,000 mg/kg Inhalation LD50 - Rat: 169 mg/L/4 Hr
BENZENE	71-43-2	Oral LD50 - Rat: 3306 mg/kg; Dermal LC50 - Rabbit: 8260 mg/kg; Inhalation LC50 - Rat: 10,000 ppm/7 hrs
ETHYLBENZENE	100-41-4	Oral LD50 - Rat: 3500 mg/kg; Dermal LD50 - Rabbit: 17,800 mg/kg
CUMENE	98-82-8	Oral LD50 - Rat: 2910 mg/kg Dermal LC50 - Rabbit: 10,600 mg/kg; Inhalation LC50 - Rat: 8000 ppm/48hrs
DICYLCOPENTADIENE	77-73-6	Oral LD50 - Rat: 590 mg/kg; Dermal LD50 - Rabbit: 5080 mg/kg; Inhalation LC50 - Rat: 3.57 mg/ L /4 hr
NAPHTHALENE	91-20-3	Oral LD50 - Rat: 490 mg/kg Oral LD50 - Rat (Sprague Dawley): 2600 mg/kg Dermal LC50 - Rat: > 20 g/kg

11.5 Carcinogenicity

IARC (International Agency for Research on Cancer):

Benzene is listed as: Carcinogenic to humans (Group 1)

Naphthalene, Cumene, and Ethylbenzene are listed as: Possibly carcinogenic to humans (Group 2B)

NTP (National Toxicology Program):

Benzene is listed as: Known carcinogen.

Naphthalene is listed as: Reasonably anticipated to be a human carcinogen.

OSHA (U.S. Occupational Health and Safety Administration):

Benzene is listed as a carcinogen by OSHA (29CFR 1910 Subpart Z).

12. ECOLOGICAL INFORMATION

12.1 Ecotoxicity

This material is expected to be toxic to aquatic organisms.

Compound Name	CAS #	TEST-SPECIES-RESULTS
TOLUENE	108-88-3	LC 50 - Cancer Magister: 28mg/L/96 Hr; LC 50-Crangon Franciscorum: 4.3 mg/L/96 Hr; LC 50 - Pimephales Promelas: 34mg/L/96 Hr; LC 50 - Palaemonetes Pugio: 9.5 mg/L/ 96 Hr
XYLENE	1330-20-7	LC 50 - Daphnia Magna: 150 mg/ L/ 24 Hr; EC 50 - Chlorococcales: 100 mg/L/24 Hr; LC 50 - Palaemonetes Pugio: 14 mg/L/ 24 Hr
HEXANE	110-54-3	LC 50 - Daphnia Magna: >50 mg/ L/ 24 Hr; LC 50 - Goldfish: 4 mg/ L/ 24 Hr
BENZENE	71-43-2	LC 50 - Cancer Magister: 108 ppm/96 Hr; LC 50-Crangon Franciscorum: 20 mg/L/96 Hr; LC 50 - Morone Saxatilis: 5.8 - 11 mg/L/96 Hr; LC 50 - Palaemonetes Pugio: 27 ppm/ 96 Hr
ETHYLBENZENE	100-41-4	LC 50 - Lepomis Macrochirus: 32mg/L/96 Hr; LC 50 - Carassius Auratus: 99.4 mg/L/ 96 Hr; LC 50 - Mysidopsis Bahia: 87.6 mg/L/ 96 Hr; LC 50-Pimephales Promelas: 42.3 mg/L/96 Hr
CUMENE	98-82-8	EC 50 - Daphnia Magna: 0.6 ppm/48 Hr; LC 50-Pimephales Promelas: 6.32 mg/L/96 Hr; Oral LD 50 - Agelaiua Phoeniceus: 98 mg/kg
DICYLCOPENTADIENE	77-73-6	LC 50 - Oryzias Latipe: 4.3 mg/L/96 Hr
NAPHTHALENE	91-20-3	LC 50-Oncorhynchus Gorbuscha:1.4mg/L/96 Hr; EC 50 - Pandalus Goniurus: 2.2 mg/L/96 Hr; EC 50 - Pimephales Promelas: 6.35 mg/L/48 Hr

12.2 Persistence and Degradability

According to National Library of Medicine's Hazardous Substances Data Bank [NLM HSDB]: The rate of degradation for gasolines varies depending upon the chemical structure of the individual components.

Hydrocarbons in the C5-C9 range are biodegradable only at low concentrations since at higher concentrations they exhibit membrane-solvent toxicity to soil microbes.

Hydrocarbons with condensed ring structures, such as polyaromatic hydrocarbons (PAHs), and cycloalkanes are relatively resistant to biodegradation.

12.3 Bioaccumulative potential

The bioaccumulation potentials of the major components of gasoline range from low to high. Some higher molecular weight components may be taken up by fish and domestic animals and bioconcentrated if they persist in environmental media. [NLM HSDB]

12.4 Mobility in soil

Log Koc values for the individual components of gasoline have been reported to range from 1.81-4.56. Based on a classification scheme, these Koc values suggest the components of gasoline will have high to no mobility in soil. [NLM HSDB]

12.5 Other adverse effects

No data available.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product disposal

Recover or recycle if possible.

It is the responsibility of the waste generator to determine the physical characteristics and toxicity of the material generated in order to properly designate the waste classification and disposal methods in compliance with applicable regulations.

Do not dispose into the environment, in drains, or allow to enter waterways. Waste product should not be allowed to contaminate soil or water.

Container disposal

Follow all SDS/label precautions even after container is emptied because they may retain product residues.

Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed.

Empty containers should be taken for recycling, recovery, or disposal through a suitable qualified or licensed contractor and in accordance with governmental regulations.

Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition as this may cause them to explode.

14. TRANSPORT INFORMATION

U.S. DOT

14.1 UN/NA number:	UN1203
14.2 Proper Shipping Name:	Gasoline
14.3 Transport Hazard Class:	3
14.4 Packing Group:	II
14.5 Environmental Hazards:	Not listed in Appendix B to 49 CFR §172.101.
IMDG Marine pollutant:	Yes
14.6 Special precautions for the user	
ERG (Emergency Response Guide) Number:	128

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and IBC Code

MARPOL Category:	
IBC Code:	IBC02

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This safety datasheet complies with the requirements of 29 CFR §1910.1200

Consult OSHA Benzene Standard found in 29 CFR 1910.1028 for requirements related to employee training, workplace monitoring, etc.

This material or all of its components are listed on the Inventory of Existing Chemical Substances under the Toxic Substance Control Act (TSCA) or are exempt from reporting.

FEDERAL REGULATORY LISTS:

Compound Name	CAS #	SARA 313	CERCLA	RCRA	CAA
TOLUENE	108-88-3	313	1,000	U220	N.L
XYLENE	1330-20-7	313	100	U239	N.L
HEXANE	110-54-3	313	5,000	N.L	N.L
BENZENE	71-43-2	313	10	U019	N.L
ETHYLBENZENE	100-41-4	313	1,000	N.L	N.L
CUMENE	98-82-8	313	5,000	U055	N.L
DICYLCOPENTADIENE	77-73-6	313	N.L	N.L	N.L
NAPHTHALENE	91-20-3	313	100	U165	N.L

N.L. - Not listed on regulatory list

CALIFORNIA REGULATIONS:

WARNING: This product contains substances known to the State of California to cause cancer, birth defects, or other reproductive harm at levels which would require a warning under the statute.

Compound Name	CAS #	TYPE OF TOXICITY	AMOUNT
TOLUENE	108-88-3	DEVELOPMENTAL	0-30%
BENZENE	71-43-2	CANCER, DEVELOPMENTAL	0-10%
ETHYLBENZENE	100-41-4	CANCER	0-10%
CUMENE	98-82-8	CANCER	0-10%
NAPHTHALENE	91-20-3	CANCER	0-10%

PENNSYLVANIA REGULATIONS:

The following product components are cited on the Pennsylvania Special Hazardous Substances List, Pennsylvania Hazardous Substances List, and/or the Pennsylvania Environmental Hazardous Substances List, and are present at levels which require reporting.

Compound Name	CAS #	LISTING	AMOUNT
TOLUENE	108-88-3	PA RTK	0-30%
XYLENE	1330-20-7	PA RTK	0-30%
HEXANE	110-54-3	PA RTK	0-20%
BENZENE	71-43-2	PA RTK - SPECIAL HAZARD	0-10%
ETHYLBENZENE	100-41-4	PA RTK	0-10%
CUMENE	98-82-8	PA RTK	0-10%
DICYLCOPENTADIENE	77-73-6	PA RTK	0-10%
NAPHTHALENE	91-20-3	PA RTK	0-10%

ADDITIONAL STATE REGULATIONS:

Components of this product are found on the following state lists.

Compound Name	CAS #	STATE LISTS
TOLUENE	108-88-3	DE, FL, IL, MA, MI, NJ, NY, RI, WI
XYLENE	1330-20-7	DE, FL, IL, MA, MI, NJ, NY, RI, WI
HEXANE	110-54-3	DE, FL, IL, MA, NJ, NY, RI, WI
BENZENE	71-43-2	DE, FL, IL, MA, ME, MI, NJ, NY, RI, WI
ETHYLBENZENE	100-41-4	DE, FL, IL, MA, ME, NJ, RI, WI
CUMENE	98-82-8	DE, FL, IL, MA, NJ, NY, RI, WI
DICYLCOPENTADIENE	77-73-6	DE, FL, MA, MN, NJ, RI, WI
NAPHTHALENE	91-20-3	DE, FL, MA, ME, MN, NJ, NY, RI, WI

15.2 Chemical safety assessment

No data available.

16. OTHER INFORMATION

Reason for Issue: New SDS
Approval date: August 7, 2013
Supersedes date: New

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This information is furnished without warranty, expressed or implied except that it is accurate to the best knowledge of Intergulf Corporation. The data on this sheet are related only to the specific material herein. Intergulf Corporation assumes no responsibility for the use or reliance upon these data.

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END OF SDS

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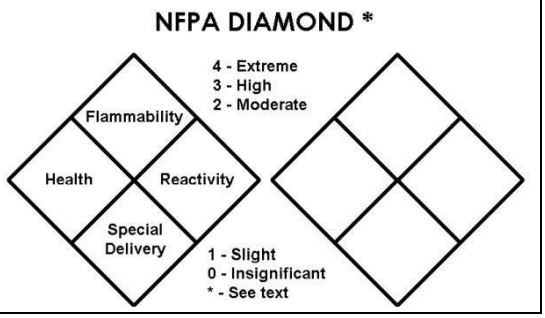
SAFETY DATA SHEET

1. PRODUCT IDENTIFICATION

24-HOUR EMERGENCY ASSISTANCE	GENERAL ASSISTANCE
Gas Control (888) 650-8099 CHEMTREC Assistance (800) 424-9300	Phone (713) 650-8900 Fax (713) 821-2080
MSDS NUMBER 1004	



MANUFACTURER/SUPPLIER: Enbridge, (U.S.), Inc.
1100 Louisiana Street, Suite 3300
Houston, Texas 77002

Name:
NAPTHA

CAS NUMBER: 8030-30-6
(as a mixture)

Synonym/Product Name:	Naphtha, Light Straight Run Naphtha, Isomerate, Gasoline, Refromate, Gasoline blend stock, Pretreated Naphtha
Chemical Family:	Petroleum Naphtha
Molecular Formula:	C8H18
Molecular Weight:	157.5

Product Use: Product is a complex mixture of petroleum hydrocarbons that contain hydrocarbons in the C4-C10 range. This product is used as a feedstock or blend stock for production of gasoline.

2. HAZARD IDENTIFICATION

CLASSIFICATION:	Flammable Liquids, Category 1 Skin Irritation, Category 2 Germ Cell Mutagenicity, Category 1B Carcinogenicity, Category 1A Toxic to Reproduction, Category 2 Specific Target Organ Toxicity (Single Exposure), Category 3 - Narcotic Effects Specific Target Organ Toxicity (Repeated Exposure), Category 1 Aspiration Hazard, Category 1
Health: 	Warning! This material is considered hazardous by the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200). Signal Word : DANGER Hazard Summary : Extremely flammable. Irritating to eyes and respiratory system. Affects central nervous system. Harmful or fatal if swallowed. Aspiration Hazard.
Potential Health affects 	: High vapor concentration or contact may cause irritation and discomfort. Skin : Brief contact may cause slight irritation. Skin irritation leading to dermatitis may occur upon prolonged or repeated contact. Can be absorbed through skin. Ingestion : Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after Ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Inhalation : Vapors or mists from this material can irritate the nose, throat, and lungs, and can cause signs and symptoms of central nervous system depression, depending on the concentration and duration of exposure. Inhalation of high concentrations may cause central nervous system depression such as dizziness,
Flammability: 	Danger! Extremely flammable HMIS Classification for Flammability: 3

Reactivity: Stable
HMIS Classification for Reactivity: 0

Hazard Statements:
Extremely flammable liquid and vapor.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
Suspected of damaging fertility or the unborn child.
May cause drowsiness or dizziness.
Causes damage to organs through prolonged or repeated exposure.
May be fatal if swallowed and enters airways.

PRECAUTIONARY STATEMENTS
Prevention: Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, and hot surfaces. – No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical, ventilating, and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe mist, vapors, or spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves, protective clothing and eye protection.

3. COMPOSITION OF INGREDIENTS

Component	CAS-No	Weight
Petroleum distillates (Naphtha)	8002-05-9	100%
Benzene, dimethyl	1330-20-7	0 - 0.1, 0.1 - 1, 1 - 5, 5 - 10, 10 - 25*
Benzene, Methyl (Toluene)	108-88-3	0 - 0.1, 0.1 - 1, 1 - 5, 5 - 10, 10 - 16*
n-Hexane	110-54-3	0 - 0.1, 0.1 - 1, 1 - 5, 5 - 10, 10 - 13*
Cyclohexane	110-82-7	0 - 0.1, 0.1 - 1, 1 - 4

1,2,4-Trimethylbenzene	95-63-6	0 - 0.1, 0.1 - 1, 1 - 5*
Naphthalene	91-20-3	0 - 0 .1
Benzene	71-43-2	0 - 0.1, 0.1 - 1, 1 - 2*
Benzene, ethyl-	100-82-7	0 - 0.1, 0.1 - 1, 1 - 4.5*

4. FIRST AID

General advice: Remove from exposure, lie down. In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). When symptoms persist or in all cases of doubt, seek medical advice. Never give anything by mouth to an unconscious person. Take off all contaminated clothing immediately and thoroughly wash material from skin.

Ingestion: If swallowed Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately.

Skin Contact: In case of contact, immediately flush skin with plenty of water. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Contaminated leather, particularly footwear, must be discarded. Note that contaminated clothing may be a fire hazard. Seek medical advice if symptoms persist or develop.

Eye Contact: Remove contact lenses. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.

Ingestion: If swallowed: Do NOT induce vomiting. Immediately call a poison center or doctor. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Never give anything by mouth to an unconscious person. If breathing or the heart stops, trained personnel should immediately begin artificial respiration (AR) or cardiopulmonary resuscitation (CPR) respectively. Get medical attention immediately. **Acute and delayed symptoms and effects:** May be fatal if swallowed and enters airways. May cause gastrointestinal irritation. Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

Notes to physician: Symptoms: Dizziness, Discomfort, Headache, Nausea, Kidney disorders, Liver disorders

5. FIRE FIGHTING MEASURES

Form: Liquid

Flash point -typical: -21.7 °C (-7.1 °F)

Auto Ignition temperature: 225 °C (437 °F)

Lower explosive limit: 1.2 %(V)

Upper explosive limit: 6.9 % (V)

NFPA 704

Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Does not use a solid water stream as it may scatter and spread fire.

Specific hazards during firefighting SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, firefighting foam, or Halon. LARGE FIRES: Water spray, fog or firefighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Special protective equipment for fire-fighters Fire fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear. Firefighters' protective clothing will provide limited protection.

Further information: Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam. Exposure to decomposition products may be a hazard to health. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SPECIAL PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS

Inhalation or contact with material may irritate or burn skin and eyes. Fire may produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Evacuate personnel to safe areas. Ventilate the area. Remove all sources of ignition. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental precautions: Should not be released into the environment. Avoid subsoil penetration. If the product contaminates rivers and lakes or drains, inform respective authorities.

Methods for cleaning up: Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations.

Emergency Procedures: As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. The use of explosion proof electrical equipment is recommended.

Protective Equipment: Emergency eyewash capability should be available. Wear respiratory protection as conditions warrant.

7. HANDELING AND STORAGE

- Handling: Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.

Advice on protection against fire and explosion
: Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples:
(1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vaporsthat are static accumulators.
(2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha).
(3) Storage tank level floats must be effectively bonded. For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API
Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

Dust explosion class: Not applicable

Requirements for storage areas and containers
: Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Advice on common storage: Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

Other data : No decomposition if stored and applied as directed

8. EXSPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits

List	Components	CAS- no	Type	Value
OSHA	Benzene - 29 CFR 1910.1028	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_AL	0.5 ppm
OSHA Z1	Naphtha; Low boiling point naphtha	8030-30-6	PEL	100 ppm 400 mg/m3
	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
	Cyclohexane	110-82-7	PEL	300 ppm 1,050 mg/m3
	Heptane [and isomers]	142-82-5	PEL	500 ppm 2,000 mg/m3
	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
ACGIH	Naphtha; Low boiling point naphtha	8030-30-6	TWA	400 ppm
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	N-hexane	110-54-3	TWA	50 ppm
	Cyclohexane	110-82-7	TWA	100PPM
	Heptane [and isomers]	142-82-5	TWA	400PPM
		142-82-5	STEL	500PPM
	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4-	STEL	125 PPM
	Benzene	71-43-2	TWA	0.5 PPM
		71-43-2	STEL	2.5 PPM

Eye Protection: Wear safety glasses with side shields. While Butane is normally encountered as a gas, safety glasses with side shields are important in the case of debris that may be thrown in a release incident.

A means for quick drenching and flushing of eyes should be provided for first aid pur

Engineering measures: Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use only intrinsically safe electrical equipment approved for use in classified areas.

Eye protection: Safety glasses or goggles are recommended where there is a possibility of splashing or spraying. Ensure that eyewash stations and safety showers are close to the workstation location.

Hand protection: Gloves constructed of nitrile or neoprene are recommended. Consult manufacturer specifications for further information.

Skin and body protection: If needed to prevent skin contact, chemical protective clothing such as of DuPont
TyChem®, Saranex or equivalent recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA
29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Work / Hygiene practices: Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this

9. PHYSICAL AND CHEMICAL PROPERTIES

Initial Boiling Point: 32 °C (90 °F)

Boiling Range: 32 to 204 °C (90 to 400 °F)

Flash Point: -43 °C (-45 °F) (ASTM D-56)

Evaporation Rate: Not available.

Flammability (solid, gas): Not applicable.

Lower Flammability Limit: Approximately 1.1 %

Upper Flammability Limit: Approximately 8.2 %

Vapor Pressure: Approximately 5 to 15 psi at 38 °C (100 °F) (Reid Vapor Pressure)

Vapor Density: Approximately 3.5 (Air = 1)

Relative Density: 0.64 to 0.83 (Water = 1)

Solubilities: Insoluble in water.

Partition Coefficient: n-

Octanol/Water:
Not available.

Auto-ignition Temperature: 277 °C (530 °F)

Decomposition

Temperature:
Not available.

Viscosity: 0.1 cSt at 25 °C (77 °F)

Percent Volatile, wt. %: Appreciable.

VOC Content, wt. %: Not available.

10. STABILITY AND REACTIVITY DATA

Reactivity: Stable under normal storage conditions.
Chemical Stability: Stable under normal storage conditions.
Possibility of Hazardous
Reactions: None known.
Conditions to Avoid: Contact with incompatible materials. Sources of ignition. Exposure to heat.
Incompatible Materials: Strong acids. Strong oxidizers.
Hazardous Decomposition Products: Oxides of Carbon. Hydrocarbons.

11. TOXILOGICAL INFORMATION

Carcinogenicity

NTP: Benzene (CAS-No.: 71-43-2)

IARC: Ethylbenzene (CAS-No.: 100-41-4)
Benzene (CAS-No.: 71-43-2)

OSHA: Benzene (CAS-No.: 71-43-2)

CA Prop 65: WARNING! This product contains a chemical known to the State of California to cause cancer.
Ethylbenzene (CAS-No.: 100-41-4)
Benzene (CAS-No.: 71-43-2)
: WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Toluene (CAS-No.: 108-88-3)
Benzene (CAS-No.: 71-43-2)

Skin irritation: Repeated or prolonged contact with the preparation may cause removal of natural fat from the skin resulting in desiccation of the skin. The product may be absorbed through the skin.

Eye irritation: The liquid splashed in the eyes may cause irritation and reversible damage.
Strong lachrymation can make it difficult to escape

Further information: This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH. Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, or excitation. Exposure to very high levels can result in unconsciousness and death. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.
Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.respiratory arrest and death may occur.

Target Organs: Skin. Eyes. Gastrointestinal tract. Respiratory system. Blood. Bone marrow. Liver. Kidneys. Reproductive system. Central nervous system (CNS). Peripheral nervous system.

SYMPTOMS (including delayed and immediate effects)
Inhalation: May cause drowsiness or dizziness. May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain. Excessive inhalation may cause headache, dizziness, confusion, loss of appetite and/or loss of consciousness. High vapor concentrations of Xylene are anesthetic and central nervous system depressants. Inhalation of Toluene may result in peculiar skin sensations (e. g. pins and needles) or numbness. Very high concentrations may cause unconsciousness and death.

Eye: Causes eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin: Causes skin irritation. Signs/symptoms may include localized redness, swelling, and itching.

Ingestion: May be fatal if swallowed and enters airways. May cause gastrointestinal irritation. Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

CHRONIC EFFECTS (from short and long-term exposure)
Target Organs: Skin. Eyes. Gastrointestinal tract. Respiratory system. Blood. Cardiovascular system. Bone marrow. Liver. Kidneys. Reproductive system. Central nervous system (CNS). Peripheral nervous system.

Chronic Effects: Hazardous by OSHA/WHMIS criteria. May cause chronic effects. Prolonged or repeated contact may dry skin and cause irritation. High vapor concentrations, generally greater than 10% by volume, may sensitize the heart and lead to lethal cardiac arrhythmias. Repeated dermal application of crude oils in rats produced systemictoxicity in blood, liver, thymus and bone marrow. Reports of chronic poisoning with Benzene, Toluene, Ethylbenzene or Xylene describeanemia, decreased blood cell count and bone marrow hypoplasia.Liver and kidney damage may occur. Repeated exposure of the eyes to high concentrations of Xylenes vapor may cause reversible eye damage. Chronic inhalation exposure to xylene causes midfrequency hearing loss in laboratory animals. Xylene reactssynergistically with n-hexane to enhance hearing loss. Immunodepressive effects have also been reported for Benzene. Chronic inhalation of n-Hexane may cause peripheral nerve disorders and central nervous system effects. 1,2,4- Trimethylbenzene may cause CNS changes, asthmatic bronchitis,and changes in the blood such as anemia or thrombocytopenia (i.e.low thrombocyte count that may affect the blood's ability to clot). This material contains Cyclohexane which is known to cause liver and kidney damage.
Carcinogenicity: May cause cancer. Lifetime skin painting studies in animals with whole crude oils and crude oil fractions have produced tumours in animals following prolonged and repeated skin contact. Chronic exposure to benzene has been associated with an increased incidence of leukemia and multiple myeloma (tumour composed of cells of the type normally found in the bone marrow).

12. ECOLOGICAL INFORMATION

Ecotoxicity: This product is potentially toxic to aquatic organisms and should be kept out of sewage and drainage systems and all bodies of water.

Persistence / Degradability: Primary components of this product are considered biodegradable in aerobic conditions.

Bioaccumulation / Accumulation: On release to the environment the lighter, productcomponents will readily evaporate, but the remainder may become dispersed in the water column or adsorbed to soil or sediment.

Mobility in Environment: Not available.

Other Adverse Effects: Not available.

13. DISPOSAL CONCIDERATIONS

Disposal Instructions: Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

14. TRANSPORTATION INFORMATION

REGULATORY INFORMATION	ID NUMBER	EMERGENCY RESPONSE GUIDEBOOK	PROPER SHIPPING NAME	CLASS	PACKING GROUP	PLACARD
DOT Classification	UN1268	Guide 128	PETROLEUM DISTILLATES	3	1	
TDG Classification	UN1268	Guide 128	PETROLEUM DISTILLATES	3	1	
IATA/ICAO	UN1268	Guide 128	PETROLEUM DISTILLATES	3	1	

15. REGULATORY INFORMATION

Based on available information this product does not contain any components or chemicals currently known to the State of California to cause cancer, birth defects or reproductive harm at levels which would be subject to Proposition 65. Reformulation, use or processing of this product may affect its composition and require re-evaluation.

All major components of this product are listed on the TSCA Inventory.

Additional Environmental Regulatory Information: This product contains one or more substances listed as hazardous, toxic or flammable air pollutants under Section 112 of the Clean Air Act. This product contains substances subject to accident prevention regulations when present above the threshold quantities of 10,000 pounds (Section 112 [r] of the Clean Air Act). This product contains up to 100% volatile organic compounds (VOCs) per 40 CFR Part 51.100.

There may be specific regulations at the local, regional or state level that pertain to this product.

16. OTHER INFORMATION

REVISION DATE: **8/11/15**

REPLACES SHEET DATED: **NA**

COMPLETED BY: **Enbridge (US) Inc. EHS Department**

NOTE: The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet (MSDS). However, MSDS's may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKI NG

Trade name	:	PYROLYSIS GASOLINE
CAS Number:	:	68606-10-0
Chemical characterization	:	UVCB substance (Substances of unknown or variable composition, complex reaction products or biological materials)
Chemical name	:	Light steam-cracked naphtha
Synonyms	:	Py Gas, Drip Oil; Dripolene; Debutanized Aromatic Concentrate; DAC; Aromatic Concentrate;
Identified uses	:	Chemical intermediate

Company Address
Equistar Chemicals, LP
LyondellBasell Tower, Suite 300
1221 McKinney St.
P.O. Box 2583
Houston Texas 77252-2583

Company Telephone
Customer Service 888 777-0232
product.safety@lyb.com

Emergency telephone number
CHEMTREC USA 800-424-9300
EQUISTAR 800-245-4532

E-mail address : product.safety@lyb.com
Responsible/issuing person

2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	Category 2
Aspiration hazard	Category 1
Acute toxicity; Oral	Category 4
Acute toxicity; Inhalation	Category 3
Skin irritation	gory 2
Eye irritation	Category 2
Germ cell mutagenicity; Inhalation	Category 1B
Carcinogenicity; Inhalation	Category 1A
Reproductive toxicity; Inhalation	Category 2
Reproductive toxicity	Effects on or via lactation
Specific target organ systemic toxicity - repeated exposure Blood	Category 1
Specific target organ systemic toxicity - single exposure	Category 3
Specific target organ systemic toxicity - repeated exposure Haematopoietic system, hearing organs, Nervous system, Respiratory Tract	Category 1

Acute aquatic toxicity	Category 1
Chronic aquatic toxicity	Category 2

GHS Classification Scale (1= severe hazard; 4= slight hazard)

Label elements

Hazard symbols :

Signal word : Danger

Hazard Statements : H225 Highly flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.
H302 Harmful if swallowed.
H331 Toxic if inhaled.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H340 May cause genetic defects.
H350 May cause cancer.
H361 Suspected of damaging fertility or the unborn child.
H362 May cause harm to breast-fed children.
H370 Causes damage to organs (Blood).
H335 May cause respiratory irritation.
H336 May cause drowsiness or dizziness.
H372 Causes damage to organs (Haematopoietic system, hearing organs, Respiratory Tract, Nervous system) through prolonged or repeated exposure.
H400 Very toxic to aquatic life.
H411 Toxic to aquatic life with long lasting effects.

Precautionary Statements : Prevention
P201 + P202 Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P240 Ground and bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting equipment.
P242 Use only non-sparking tools.
P243 Take action to prevent static discharges.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P263 Avoid contact during pregnancy and while nursing.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response
P370 + P378 In case of fire: Use dry chemical, carbon dioxide, water spray, or foam.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
P363 Wash contaminated clothing before reuse.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P391 Collect spillage.

Storage
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.

Disposal
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

Hazards Not Otherwise Classified (HNOC)
Static-accumulating flammable liquid

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances

Ingredients

Chemical name	CAS-No. EC-No.	Weight %	Component Type
Gasoline, pyrolysis, debutanizer bottoms	68606-10-0	<100.0 %	A
Dicyclopentadiene	77-73-6	<15.0 %	D
Benzene	71-43-2	10.0 - 65.0 %	D
Toluene	108-88-3	5.0 - 25.0 %	D

Ethyl Benzene	100-41-4	<25.0 %	D
Xylene	1330-20-7	<15.0 %	D
Styrene	100-42-5	<10.0 %	D
Isoprene	78-79-5	<10.0 %	D
Naphthalene	91-20-3	<10.0 %	D
n-Pentane	109-66-0	<5.0 %	D
Isopentane	78-78-4	<5.0 %	D
1,3-Cyclopentadiene	542-92-7	<5.0 %	D
Indene	95-13-6	5.0 - 15.0 %	D
1,3-Butadiene	106-99-0	<3.0 %	D
Cyclopentane	287-92-3	<3.0 %	D

Product is considered to be a complex mixture containing primarily C5-C10 aromatic compounds but may include some olefins and paraffins.
The actual components and weight percent concentrations vary based on operating conditions.

Key:
(A) Substance
(D) Constituent affecting classification

4. FIRST AID MEASURES

General advice : Consult a physician/doctor if necessary.
Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid.
Show this material safety data sheet to the doctor in attendance.
Do not leave the victim unattended.

If inhaled : Move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. When breathing is difficult, properly trained personnel may assist the affected person by administering oxygen. Keep the affected person warm and at rest. Get medical attention immediately.

In case of skin contact : Immediately remove excess chemical and contaminated clothing; thoroughly wash contaminated skin with mild soap and

water. If irritation persists after washing, seek medical attention. Thoroughly clean contaminated clothing before reuse; discard contaminated leather goods (gloves, shoes, belts, wallets, etc.).

In case of eye contact : Thoroughly flush the eyes with large amounts of clean low-pressure water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation persists, seek medical attention.

If swallowed : DO NOT induce vomiting. If vomiting does occur, have victim lean forward to reduce risk of aspiration. Get medical attention immediately.

Notes to physician

Symptoms : Signs of eye, throat, and respiratory tract irritation (cough and difficulty breathing), CNS depression (fatigue, dizziness, headache, collapse, coma and death) and possible cardiac sensitization may occur after exposure to high vapor concentrations.
Symptoms following ingestion of benzene include vomiting, loss of coordination, shallow/rapid pulse, loss of concentration, delirium, chemical pneumonitis, initial CNS stimulation followed by CNS depression, dizziness, pallor, flushing, weakness, headache

Hazards : May be fatal if swallowed and enters airways.
Toxic if inhaled.
Harmful if swallowed.
Causes skin irritation.
Causes serious eye irritation.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Causes damage to organs.

Treatment : Treat symptomatically.
Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.
Do not induce vomiting.
Consider activated charcoal and/or gastric lavage.
Gastric lavage is indicated in those patients who require decontamination. Be sure that an endotracheal tube is in place prior to lavage; use cuffed tubes in patients over 7 years of age.
Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias (irregular beating) in persons exposed to this material.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	SMALL FIRE: Use dry chemical, CO_2, water spray or regular foam LARGE FIRES: water spray water fog foam
Unsuitable extinguishing media	:	Do not use a solid water stream as it may scatter and spread fire.
Specific hazards during fire fighting	:	When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Vapors may travel long distances along the ground before reaching a source of ignition and flashing back. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if it can be done without risk. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Always stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Sustained fire attack on vessels may result in a Boiling Liquid Expanding Vapour Explosion (BLEVE). Notify authorities immediately if liquid enters sewer/public waters. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Special protective equipment for fire-fighters	:	Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighter's protective clothing will only provide limited protection.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Use personal protective equipment. Ensure adequate ventilation. Eliminate all sources of ignition. Evacuate personnel to safe areas.

Environmental precautions	:	Prevent entry into waterways, sewers, basements or confined areas. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for containment / Methods for cleaning up	:	Highly flammable liquid and vapour. Notify fire and environmental authorities. Release can cause fire/explosion/health/environmental hazards. Eliminate all sources of ignition. Evacuate/limit access. Ensure adequate ventilation. All equipment used when handling this product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Water spray may reduce vapor; but may not prevent ignition in closed spaces. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). For larger spillages on water contain with booms or barriers, use surface acting agents to thicken spilled materials. Remove trapped material with suction hoses.
Additional advice	:	See Section 15: Regulatory Information.

7. Handling and storage

Precautions for safe handling

Advice on safe handling	:	Electrostatic charges may be generated as a result of flow or agitation. Use only non-sparking tools. Carefully vent any internal pressure before removing closure. Metal containers involved in the transfer of this material should be grounded and bonded. Wear recommended personal protective equipment. Do not overfill containers which may burst on freezing. Thaw frozen containers only at room temperature. Containers must be properly grounded before beginning

transfer.
All equipment must conform to applicable electrical code.
Handle used containers with care - residue is flammable/poisonous.
Isolate, vent, drain, wash and purge systems or equipment before maintenance or repair.
Extinguish all ignition sources.
Check atmosphere for explosiveness and oxygen deficiencies.
If any residual product may be present, total encapsulating impervious protective suits, gloves, and boots should be worn.
Observe precautions pertaining to confined space entry.
Provide grounding/equipment conforming to electrical codes.
Bonding and grounding measures may not be enough if nonconductive flammable liquids are involved. Refer to NFPA 77 for relevant consensus guidance.
Do not pressurize or expose empty containers to open flame, sparks, or heat.

Fire-fighting class : OSHA/NFPA Class IB Flammable Liquid.

Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Keep containers tightly closed when not in use and store in a well-ventilated area. Isolate incompatible materials such as oxidizers. Containers should be clearly labeled. Metal containers used to store this material should be grounded.
Bonding and grounding measures may not be enough if nonconductive flammable liquids are involved. Refer to NFPA 77 for relevant consensus guidance.
This liquid may accumulate static electricity even when transferred into properly grounded containers.
Static electricity accumulation may be significantly increased by the presence of small quantities of water.
Store only in tightly closed, properly vented containers away from heat, sparks, open flame and strong oxidizing agents.
Store closed drums with bung in up position.
Flammable materials should be stored in a separate safety storage cabinet or room.
Avoid breathing vapors in top of shipping container; may contain a known human carcinogen.
Vapor space above stored liquid may be flammable/explosive unless blanketed with inert gas.

Specific end use(s)

: See Section 1.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Ingredients with workplace control parameters

Occupational Exposure Limits

Ingredients	CAS-No.	Type	Limit Value	Basis Revision Date	Additional Information
Dicyclopentadiene	77-73-6	TWA	5 ppm	US (ACGIH) 2012	
Benzene	71-43-2	STEL	2.5 ppm	US (ACGIH) 2012	
Benzene	71-43-2	TWA	0.5 ppm	US (ACGIH) 2012	
Benzene	71-43-2	IDLH	500 ppm	NIOSH September 2007	
Benzene	71-43-2	Peak	50 ppm	98/24/EC June 23, 2006	
	Remarks: 10 minutes				
Benzene	71-43-2	CEILING	25 ppm	US (OSHA) June 23, 2006	
Benzene	71-43-2	STEL	5 ppm	US (OSHA) June 23, 2006	
	See 29 CFR 1910.1028				
Benzene	71-43-2	TWA	10 ppm	US (OSHA) June 23, 2006	
Benzene	71-43-2	TWA	1 ppm	US (OSHA) June 23, 2006	
Toluene	108-88-3	TWA	20 ppm	US (ACGIH) 2012	
Toluene	108-88-3	IDLH	500 ppm	NIOSH September 2007	
Toluene	108-88-3	Peak	500 ppm	98/24/EC June 23, 2006	
	Remarks: 10 minutes				

Toluene	108-88-3	CEILING	300 ppm	US (OSHA) June 23, 2006	
Toluene	108-88-3	TWA	200 ppm	US (OSHA) June 23, 2006	
Ethyl Benzene	100-41-4	TWA	20 ppm	US (ACGIH) 2012	
Ethyl Benzene	100-41-4	IDLH	800 ppm	NIOSH September 2007	
	Remarks: 10% LEL				
Ethyl Benzene	100-41-4	TWA	100 ppm 435 mg/m3	US (OSHA) June 23, 2006	
Xylene	1330-20-7	STEL	150 ppm	US (ACGIH) 2012	
Xylene	1330-20-7	TWA	100 ppm	US (ACGIH) 2012	
Xylene	1330-20-7	TWA	100 ppm 435 mg/m3	US (OSHA) June 23, 2006	
Styrene	100-42-5	STEL	40 ppm	US (ACGIH) 2012	
Styrene	100-42-5	TWA	20 ppm	US (ACGIH) 2012	
Styrene	100-42-5	IDLH	700 ppm	NIOSH September 2007	
Styrene	100-42-5	Peak	600 ppm	98/24/EC June 23, 2006	
	Remarks: 5 minutes in any 3 hours				
Styrene	100-42-5	CEILING	200 ppm	US (OSHA) June 23, 2006	
Styrene	100-42-5	TWA	100 ppm	US (OSHA) June 23, 2006	
Naphthalene	91-20-3	TWA	10 ppm	US (ACGIH) 2012	
Naphthalene	91-20-3	IDLH	250 ppm	NIOSH September 2007	

Naphthalene	91-20-3	TWA	10 ppm 50 mg/m3	US (OSHA) June 23, 2006	
n-Pentane	109-66-0	TWA	1,000 ppm	US (ACGIH) 2014	
n-Pentane	109-66-0	IDLH	1,500 ppm	NIOSH September 2007	
	Remarks: 10% LEL				
n-Pentane	109-66-0	TWA	1,000 ppm 2,950 mg/m3	US (OSHA) June 23, 2006	
Isopentane	78-78-4	TWA	1,000 ppm	US (ACGIH) 2014	
1,3-Cyclopentadiene	542-92-7	TWA	75 ppm	US (ACGIH) 2012	
1,3-Cyclopentadiene	542-92-7	IDLH	750 ppm	NIOSH September 2007	
1,3-Cyclopentadiene	542-92-7	TWA	75 ppm 200 mg/m3	US (OSHA) June 23, 2006	
Indene	95-13-6	TWA	5 ppm	US (ACGIH) 2012	
1,3-Butadiene	106-99-0	TWA	2 ppm	US (ACGIH) 2012	
1,3-Butadiene	106-99-0	IDLH	2,000 ppm	NIOSH September 2007	
	Remarks: 10% LEL				
1,3-Butadiene	106-99-0	STEL	5 ppm	US (OSHA) June 23, 2006	
	See 29 CFR 1910.1051				
1,3-Butadiene	106-99-0	TWA	1 ppm	US (OSHA) June 23, 2006	
Cyclopentane	287-92-3	TWA	600 ppm	US (ACGIH) 2012	

Consult local authorities for acceptable exposure limits.

Biological Exposure Indices

Ingredients	CAS-No.	Control parameters	Biological specimen	Sampling time	Concentration	Basis
Benzene	71-43-2	S-Phenylmercapturic acid	urine	end of shift	25 µg/g creatinine	ACGIH_BEIS
		Remarks: background.				
Benzene	71-43-2	t,t-Muconic acid	urine	end of shift	500 µg/g creatinine	ACGIH_BEIS
		background.				
Toluene	108-88-3	Toluene	blood	prior to last shift of workweek	0.02 mg/l	ACGIH_BEIS
Toluene	108-88-3	Toluene	urine	end of shift	0.03 mg/l	ACGIH_BEIS
Toluene	108-88-3	o-Cresol with hydrolysis	urine	end of shift	0.3 mg/g creatinine	ACGIH_BEIS
		Remarks: background.				
Ethyl Benzene	100-41-4	Sum of mandelic acid and phenylglyoxylic acid	urine	end of shift	0.15 g/g creatinine	ACGIH_BEIS
		Remarks: nonspecific.				
Xylene	1330-20-7	Methylhippuric acids	urine	end of shift	1.5 g/g creatinine	ACGIH_BEIS
Styrene	100-42-5	Mandelic acid plus phenylglyoxylic acid	urine	end of shift	400 mg/g creatinine	ACGIH_BEIS
		Remarks: nonspecific.				
Styrene	100-42-5	Styrene	urine	end of shift	40 mg/m3	ACGIH_BEIS
1,3-Butadiene	106-99-0	1,2-Dihydroxy-4-(N-acetylcysteinyl)-butane	urine	end of shift	2.5 mg/l	ACGIH_BEIS
		Remarks: background, semi-quantitative.				
1,3-Butadiene	106-99-0	Mixture of N-1 and N-2-(hydroxybutenyl)valine hemoglobin adducts	blood	not critical	2.5 pmol/g hemoglobin	ACGIH_BEIS
		semi-quantitative.				

Exposure controls

Engineering measures

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits.

Personal protective equipment

Respiratory protection	:	When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. For unknown vapor concentrations use a positive-pressure, pressure-demand, self-contained breathing apparatus (SCBA).
Hand protection	:	Wear chemical resistant gloves such as: Glove material fluoroelastomer; material thickness 0.4 mm; break through time ≥ 480 min. Gloves must be replaced after 8 hours of wear. Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Eye and face protection	:	Wear safety glasses as minimum eye protection. Conditions may warrant the use of chemical goggles and possibly a face shield. Consult your standard operating procedure or safety professional for advice. Use protective eye and face devices that comply with ANSI Z87.1-1987.
Skin and body protection	:	When skin contact is possible, protective clothing including gloves, apron, sleeves, boots, head and face protection should be worn. Choose body protection according to the amount and concentration of the dangerous substance at the work place. Use PPE that is chemical resistant to the product and prevents skin contact. Fire retardant clothing is appropriate for routine occupational use. Wear long-sleeved fire-retardant garments (e.g., Nomex (R)) while working with flammable and combustible liquids.
Hygiene measures	:	Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Take off contaminated clothing and wash before reuse. Shower after work using plenty of soap and water.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Color	:	Typically yellow. May range from clear to amber or brown.
Odor	:	Sweet aromatic
Odor Threshold	:	No Data Available.
Flash point	:	< -40 °C Method: closed cup
Lower explosion limit	:	1.3 vol%
Upper explosion limit	:	8 vol%
Oxidizing properties	:	No Data Available.
Autoignition temperature	:	498 °C
Decomposition temperature	:	not determined
Melting point/freezing point	:	< -60 °C
Boiling point/boiling range	:	>= 37.7 °C
Vapor pressure	:	99.97 hPa at 20 °C < 12 psia (RVP)
Density	:	0.866 g/cm3
Water solubility	:	Partially soluble in cold water.
Partition coefficient: n-octanol/water	:	No Data Available.
Viscosity, dynamic	:	32.6 mPa.s
Viscosity, kinematic	:	< 1 mm2/s at 37.8 °C
Relative vapor density	:	3.1 (Air = 1.0)
Explosive properties	:	No Data Available.
Other Information	:	No additional information available.

10. STABILITY AND REACTIVITY

Reactivity	:	Will not occur.
Chemical stability	:	Stable under recommended storage conditions.
Hazardous reactions	:	Not expected to occur. 1,3-butadiene may react with oxygen to form unstable butadiene peroxides. Butadiene peroxides are thermally unstable, shock sensitive and may lead to the formation of popcorn polymer.
Conditions to avoid	:	Avoid contact with strong oxidizers, excessive heat, sparks or open flame.
Materials to avoid	:	Heat and oxidizers Phenol, ethanol, chlorine dioxide, crotonaldehyde, nitric acid, oxygen and other strong oxidizers, and acetylide forming materials such as copper, magnesium, mercury, silver and monel. Contact may form violently explosive peroxides.
Hazardous decomposition products	:	No decomposition if stored and applied as directed.
Thermal decomposition	:	Excessive heating and/or incomplete combustion may produce carbon monoxide, hydrogen sulfide and other harmful gases or vapors including oxides and/or other compounds of sulfur and sodium.

11. TOXICOLOGICAL INFORMATION

Product Summary	:	The below given information is based on the assessment of the product including impurities. Percent of unknown acute toxicity in the mixture: ≤ 10%

Acute toxicity

Acute oral toxicity	:	Classified Harmful if swallowed.
	:	LD50: 888 mg/kg Method: Acute toxicity estimate
Acute inhalation toxicity	:	Classified Toxic if inhaled.
	:	LC50: 4.66 mg/l Method: Acute toxicity estimate

Acute dermal toxicity : Based on acute toxicity values, not classified.
Repeated contact with skin may cause cracking and/or fissuring.

: LD50: > 5,000 mg/kg
Method: Acute toxicity estimate

Skin corrosion/irritation : Classified
Causes skin irritation.

Serious eye damage/eye irritation : Classified
Causes serious eye irritation.

Respiratory or skin sensitization : Respiratory sensitization
Not classified
No study available.

: Skin sensitization
Not classified
Based on component data, product is not expected to induce sensitization.

Chronic toxicity

Component Name	NTP	IARC	OSHA
Benzene	known as a human carcinogen	1	Present
Ethyl Benzene		2B	Present
Styrene	Reasonably Anticipated	2B	Present
Naphthalene	Reasonably Anticipated	2B	Present
Isoprene	Reasonably Anticipated	2B	Present
1,3-Butadiene	known as a human carcinogen	1	Present

Carcinogenicity : Classified
May cause cancer.

Germ cell mutagenicity : Classified
May cause genetic defects.

Reproductive toxicity

Effects on fertility / : Classified

Effects on or via lactation	Suspected of damaging fertility. May cause harm to breast-fed children.
Effects on Development	: Classified Suspected of damaging the unborn child.
Target Organ Systemic Toxicant - Single exposure	: Classified, Causes damage to organs.
	: May cause respiratory irritation., May cause drowsiness or dizziness.
	: Target Organs: Blood
Target Organ Systemic Toxicant - Repeated exposure	: Classified, Causes damage to organs through prolonged or repeated exposure.
	: Target Organs: Haematopoietic system, hearing organs, Nervous system, Respiratory Tract
	: May cause liver and/or kidney damage.
Aspiration hazard	: Classified May be fatal if swallowed and enters airways.

12. Ecological information

Ecotoxicology Assessment

Acute aquatic toxicity	: Classified, Very toxic to aquatic life.
Chronic aquatic toxicity	: Classified, Toxic to aquatic life with long lasting effects.
Toxicity to fish	: Very toxic to fish.
	: LC50: 0.96 mg/l Exposure time: 48 HOURS Test substance: Naphthalene
	: LC50: 5.5 mg/l Exposure time: 96 HOURS Species: Oncorhynchus kisutch Test substance: Toluene
	: LC50: 5.3 mg/l Exposure time: 96 HOURS Species: Oncorhynchus mykiss Test substance: Benzene

Toxicity to daphnia and other aquatic invertebrates	:	Toxic to aquatic invertebrates.
	:	EC50: 0.62 mg/l Exposure time: 48 HOURS Test substance: Dicyclopentadiene
	:	EC50: 3.78 mg/l Exposure time: 48 HOURS Species: Ceriodaphnia dubia Test substance: Toluene
	:	EC50: 10 mg/l Exposure time: 48 HOURS Species: Daphnia magna. Test substance: Benzene
Toxicity to algae	:	Harmful to algae.
	:	EC50: 3.6 mg/l Exposure time: 96 HOURS Test substance: Ethylbenzene
	:	NOEC: 10 mg/l Exposure time: 72 HOURS Species: Pseudokirchneriella subcapitata Test substance: Toluene
	:	EC50: 29 mg/l Exposure time: 72 HOURS Species: Pseudokirchneriella subcapitata Test substance: Benzene
Toxicity to bacteria	:	Harmful to bacteria.
	:	IC50: 13 mg/l Exposure time: 24 HOURS Species: Nitrosomonas sp. Test substance: Benzene
	:	EC50: 84 mg/l Exposure time: 24 HOURS Species: Activated sludge Test substance: Toluene
Toxicity to fish (Chronic toxicity)	:	Toxic to fish with long lasting effects.
		LC50: 8.25 mg/l Exposure time: 27 d Species: Oncorhynchus mykiss Test substance: Benzene

EC10: >= 0.013 mg/l
Exposure time: 14 d
Species: Oncorhynchus mykiss
Test substance: Benzene

NOEC: 1.4 mg/l
Exposure time: 14 d
Species: Oncorhynchus kisutch
Test substance: Toluene

NOELR: 6.165 mg/l
Exposure time: 28 d
Species: Oncorhynchus mykiss
Test substance: n-Pentane
(QSAR calculated value)

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : Toxic to invertebrates with long lasting effects.

NOEC: 0.74 mg/l
Exposure time: 7 d
Species: Ceriodaphnia dubia
Test substance: Toluene

NOEC: 2.97 mg/l
Exposure time: 7 d
Species: Ceriodaphnia dubia
Test substance: Benzene

NOELR: 10.76 mg/l
Exposure time: 21 d
Species: Daphnia magna.
Test substance: n-Pentane
(QSAR calculated value)

Persistence and degradability

Biodegradability : Expected to be biodegradable

Stability in water : Not expected to hydrolyze readily.

Stability in soil : Low potential for soil adsorption expected

Bioaccumulative potential

Bioaccumulation : Bioconcentration factor (BCF): 0.73 - 4
This material may bioaccumulate.

Mobility in soil

Distribution among environmental compartments : The atmosphere is the main environmental compartment for releases of this material. When released to water or soil, most of this material is expected to evaporate to the atmosphere with a half-life approximately 24 hours.

Other adverse effects

Environmental fate and pathways : No additional information available.

Other information

Additional ecological information : No additional information available.

13. Disposal considerations

Waste treatment methods

Product : Disposal should be conducted through a facility equipped with and operating an air emission control device in accordance with requirements of applicable Clean Air Act regulations.
Contaminated product, soil, water, and empty containers may be hazardous wastes due to possible presence of flammable gases.
Assure emissions comply with applicable regulations.
Preferred disposal for this volatile, flammable product is through combustion.
Proper grounding procedures to avoid static electricity should be followed.
The product should not be allowed to enter drains, water courses or the soil.

: It is the responsibility for the waste generator to characterize waste streams relative to the pertinent regulatory provisions to ensure that applicable requirements are reviewed and met.
Transportation, treatment, storage, and disposal of waste material must be conducted in accordance with RCRA regulation (see 40 CFR Parts 260 through 271).
State and/or local regulations may be more restrictive.

Contaminated packaging : Do not burn, or use a cutting torch on, the empty drum.
Dispose of contents/ container to an approved waste disposal plant.

14. TRANSPORT INFORMATION

CFR_ROAD

UN number	:	1268
Description of the goods	:	PETROLEUM DISTILLATES, N.O.S.
	:	(BENZENE, XYLENE)
Class	:	3
Packing group	:	II
Labels	:	3
Marine pollutant	:	no

CFR_RAIL

UN number	:	1268
Description of the goods	:	PETROLEUM DISTILLATES, N.O.S.
	:	(BENZENE, XYLENE)
Class	:	3
Packing group	:	II
Labels	:	3
Marine pollutant	:	no

IMDG

UN number	:	1268
Description of the goods	:	PETROLEUM DISTILLATES, N.O.S. (BENZENE, XYLENE)
Class	:	3
Packing group	:	II
Labels	:	3
EmS Number 1	:	F-E
EmS Number 2	:	S-E
Marine pollutant	:	no

BLG **(MARPOL Annex II)**

Description of the goods	:	PYROLYSIS GASOLINE (CONTAINING BENZENE)
Pollution category	:	Y
Ship type	:	2

15. REGULATORY INFORMATION

If identified components of this product are listed under the TSCA 12(b) Export Notification rule, they will be listed below.

SARA 302/304

Component	TPQ	RQ
Benzene		10 lbs

Toluene	1000 lbs
Ethyl Benzene	1000 lbs
Xylene	100 lbs
Styrene	1000 lbs
Naphthalene	100 lbs
Isoprene	100 lbs
1,3-Butadiene	10 lbs

SARA 311/312
Based upon available information, this material is classified as the following health and/ or physical hazards according to Section 311 & 312:

Physical Hazards

Flammable liquids

Health Hazards

Aspiration hazard
Acute toxicity
Skin irritation
Eye irritation
Germ cell mutagenicity
Carcinogenicity
Reproductive toxicity
Specific target organ systemic toxicity - repeated exposure
Specific target organ systemic toxicity - single exposure

SARA 313
This product contains the following chemicals subject to the reporting requirements of SARA Title III, Section 313 and 40 CFR 372:

Component	Reporting Threshold
Dicyclopentadiene	1.0%
Benzene	0.1%
Toluene	1.0%
Ethyl Benzene	0.1%
Xylene	1.0%
Styrene	0.1%
Naphthalene	0.1%
Isoprene	0.1%
1,3-Butadiene	0.1%

State Reporting

This material contains the following chemical substance which is regulated under California Proposition 65. However, it is the responsibility of the California business owner to develop his or her

own regulatory compliance plan. Contact Product Safety for further information at product.safety@lyb.com.

Substance	CASRN	Type of Toxicity			
		Carcinogen	Developmental	Repro-Male	Repro-Female
Benzene	71-43-2	X	X	X	
Toluene	108-88-3		X		
Ethyl Benzene	100-41-4	X			
Naphthalene	91-20-3	X			
1,3-Butadiene	106-99-0	X	X	X	X
Styrene	100-42-5	X			

This product contains the following chemicals regulated by New Jersey's Worker and Community Right to Know Act:

77-73-6	Dicyclopentadiene
71-43-2	Benzene
108-88-3	Toluene
100-41-4	Ethyl Benzene
1330-20-7	Xylene
100-42-5	Styrene
91-20-3	Naphthalene
109-66-0	n-Pentane
78-79-5	Isoprene
78-78-4	Isopentane
542-92-7	1,3-Cyclopentadiene
95-13-6	Indene
106-99-0	1,3-Butadiene

This product contains the following chemicals regulated by Massachusetts' Right to Know Law:

77-73-6	Dicyclopentadiene
71-43-2	Benzene
108-88-3	Toluene
100-41-4	Ethyl Benzene
1330-20-7	Xylene
100-42-5	Styrene
91-20-3	Naphthalene
109-66-0	n-Pentane
78-79-5	Isoprene
78-78-4	Isopentane
542-92-7	1,3-Cyclopentadiene
95-13-6	Indene

106-99-0 1,3-Butadiene

This product contains the following chemicals regulated by Pennsylvania's Right to Know Act:

77-73-6 Dicyclopentadiene
71-43-2 Benzene
108-88-3 Toluene
100-41-4 Ethyl Benzene
1330-20-7 Xylene
100-42-5 Styrene
91-20-3 Naphthalene
109-66-0 n-Pentane
78-79-5 Isoprene
78-78-4 Isopentane
542-92-7 1,3-Cyclopentadiene
95-13-6 Indene
106-99-0 1,3-Butadiene

Other international regulations

Global Inventory Status
The ingredients of this product are compliant with the following chemical inventory requirements or exemptions.

*Additional Explanatory Status Statements follow the table, as necessary.

Country/Region	Inventory	Status Description
Australia	AICS	Compliant
Canada	DSL	Compliant
China	IECSC	Compliant
Europe	REACH	See REACH Compliance Statement
Japan	ENCS	Compliant
Korea	KECI	Compliant
New Zealand	NZIoC	Compliant
Philippines	PICCS	Compliant
United States of America	TSCA	Compliant
Taiwan	TCSCA	Compliant

REACh status
If the product has been purchased from any company of the LyondellBasell group of companies registered in the European Union, we confirm that the chemical substance in this product has been pre-registered or, where required under REACh, registered, and that we have the intention to proceed with any required registration in accordance with the deadlines set forth in REACh. (Regulation (EU) No. 1907/2006)

*Canadian Environmental Protection Act (CEPA): All components of this product are on the Domestic Substances list (DSL) or are acceptable for use under the provisions of CEPA.

Contact product.safety@lyb.com for additional global inventory information.

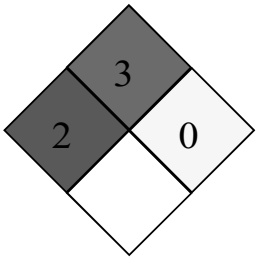
16. OTHER INFORMATION

Material safety datasheet sections which have been updated:

Revised Section(s): 15 March 6 2018

HMIS Classification : Health Hazard: 4
Chronic Health Hazard: *
Flammability: 3
Physical hazards: 0

NFPA Classification : Health Hazard: 2
Fire Hazard: 3
Instability: 0



Further information

HMIS rating scale (0 = minimal hazard; 4 = severe hazard)
NFPA rating scale (0 = minimal hazard; 4 = severe hazard)

Disclaimer

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Users should review the applicable Safety Data Sheet before handling the product.
This product(s) may not be used in the manufacture of any of the following, without prior written approval by Seller for each specific product and application:
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European Union Class I or II Medical Devices;
(ii) film, overwrap and/or product packaging that is considered a part or component of one of the aforementioned medical devices;
(iii) packaging in direct contact with a pharmaceutical active ingredient and/or dosage form that is intended for inhalation, injection, intravenous, nasal, ophthalmic (eye), digestive, or topical (skin) administration;
(iv) tobacco related products and applications, electronic cigarettes and similar devices.
(v) safety components in automotive applications, for example: air bags, air bag unit housings and covers, seat belt mechanisms, brake systems, pedals and pedal supports, steering systems.

The product(s) may not be used in:
(i) U.S. FDA Class III Medical Devices; Health Canada Class IV Medical Devices; European Class III Medical Devices;
(ii) applications involving permanent implantation into the body;
(iii) life-sustaining medical applications.

All references to U.S. FDA, Health Canada, and European Union regulations include another country's equivalent regulatory classification.
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Product Information
HMIS rating scale (0 = minimal hazard; 4 = severe hazard) NFPA rating scale (0 = minimal hazard; 4 = severe hazard)

Numerical Data Presentation
The presentation of numerical data, such as that used for physical and chemical properties and toxicological values, is expressed using a comma (,) to separate digits into groups of three and a period (.) as the decimal marker. For example, 1,234.56 mg/kg = 1 234,56 mg/kg.

Language Translations
The information presented in this document has been translated from English by a vendor LyondellBasell believes to be reliable. LyondellBasell and its vendor have made a good-faith effort to verify the accuracy of the translation, but assume no liability or other responsibility for any errors that may have occurred. Please refer to our web site (www.lyondellbasell.com) for the original document written in English.

End of Material Safety Data Sheet

Received 5/11/17

SAFETY DATA SHEET

SDS ID NO.: 0158MAR019
Revision Date: 05/14/2015

1. IDENTIFICATION

Product Name: Marathon Petroleum Xylene

Synonym: Xylene; Mixed Xylenes, Dimethyl Benzene; Methyl Toluene
Chemical Family: Aromatic Hydrocarbon

Recommended Use: Solvent. Chemical intermediate. Gasoline blending.
Use Restrictions: All others.

Supplier Name and Address:

MARATHON PETROLEUM COMPANY LP
539 South Main Street
Findlay, OH 45840

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous according to the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Carcinogenicity	Category 2
Reproductive toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Specific target organ toxicity (repeated exposure)	Category 2
Aspiration toxicity	Category 1
Acute aquatic toxicity	Category 2
Chronic aquatic toxicity	Category 3

Hazards Not Otherwise Classified (HNOC)
Static accumulating flammable liquid

Label elements

EMERGENCY OVERVIEW

Danger

FLAMMABLE LIQUID AND VAPOR
May accumulate electrostatic charge and ignite or explode

May be fatal if swallowed and enters airways
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation
May cause drowsiness or dizziness
Suspected of causing cancer
Suspected of damaging the unborn child
May cause damage to organs (nervous system, auditory system) through prolonged or repeated exposure
Toxic to aquatic life
Harmful to aquatic life with long lasting effects

Appearance Clear Liquid **Physical State** Liquid **Odor** Sweet Aromatic

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Keep away from heat/sparks/open flames/hot surfaces. — No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wash hands and any possibly exposed skin thoroughly after handling
Avoid release to the environment

Precautionary Statements - Response
IF exposed or concerned: Get medical attention
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
If skin irritation occurs: Get medical attention
Take off contaminated clothing and wash before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor if you feel unwell
IF SWALLOWED: Immediately call a POISON CENTER or doctor
Do NOT induce vomiting
In case of fire: Use water spray, fog or regular foam for extinction

Precautionary Statements - Storage
Store in a well-ventilated place. Keep container tightly closed
Keep cool
Store locked up

Precautionary Statements - Disposal
Dispose of contents/container at an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

Xylene is a mixture of eight carbon aromatic petroleum hydrocarbons composed of the three isomers of xylene (ortho, meta & para) and ethylbenzene.

Composition Information:

Name	CAS Number	Weight %
Xylene (mixed isomers)	1330-20-7	81-85
Ethylbenzene	100-41-4	15-19
Cumene	98-82-8	0-0.5
Toluene	108-88-3	0-0.3

4. FIRST AID MEASURES

First Aid Measures

General advice In case of accident or if you feel unwell, seek medical advice immediately (show directions for use or safety data sheet if possible).

Inhalation: Remove to fresh air. If not breathing, institute rescue breathing. If breathing is difficult, ensure airway is clear, give oxygen and continue to monitor. If heart has stopped, immediately begin cardiopulmonary resuscitation (CPR). Keep affected person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

Skin Contact: Immediately wash exposed skin with plenty of soap and water while removing contaminated clothing and shoes. Get medical attention if irritation persists. Place contaminated clothing in closed container until cleaned or discarded. If clothing is to be laundered, inform the person performing the operation of contaminant's hazardous properties.

Eye Contact: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Gently remove contacts while flushing. Get medical attention if irritation persists.

Ingestion: Do not induce vomiting because of danger of aspirating liquid into lungs, causing serious damage and chemical pneumonitis. If spontaneous vomiting occurs, keep head below hips, or if patient is lying down, turn body and head to side to prevent aspiration and monitor for breathing difficulty. Never give anything by mouth to an unconscious person. Keep affected person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

Most important signs and symptoms, both short-term and delayed with overexposure

Adverse Effects: Acute: Headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Delayed: Dry skin and possible irritation with repeated or prolonged exposure.

Indication of any immediate medical attention and special treatment needed

NOTES TO PHYSICIAN: INHALATION: This material (or a component) sensitizes the myocardium to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material. Administration of sympathomimetic drugs should be avoided.

INGESTION: This material represents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is not recommended.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFF/ATC) can be used. Firefighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Unsuitable extinguishing media
Do not use straight water streams to avoid spreading fire.

Specific hazards arising from the chemical
This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard and should be handled accordingly. May accumulate electrostatic charge and ignite or explode. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Hazardous combustion products
Smoke, carbon monoxide, and other products of incomplete combustion.

Explosion data
Sensitivity to Mechanical Impact No.
Sensitivity to Static Discharge No.

Special protective equipment and precautions for firefighters
Firefighters should wear full protective clothing and positive-pressure self-contained breathing apparatus (SCBA) with a full face-piece, as appropriate. Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

NFPA:	Health 2	Flammability 3	Instability 0	Special Hazards -

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:	Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources.
Protective Equipment:	Use personal protection measures as recommended in Section 8.
Emergency Procedures:	Advise authorities and National Response Center (800-424-8802) if the product has entered a water course or sewer. Notify local health and pollution control agencies, if appropriate.
Environmental precautions:	Avoid release to the environment. Avoid subsoil penetration.
Methods and materials for containment:	Contain liquid with sand or soil.
Methods and materials for cleaning up:	Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids. Recover and return free product to proper containers. When recovering free liquids ensure all equipment is grounded and bonded. Use only non-sparking tools.

7. HANDLING AND STORAGE

Safe Handling Precautions: NEVER SIPHON THIS PRODUCT BY MOUTH. Use appropriate grounding and bonding practices. Static accumulating flammable liquid. Bonding and grounding may be insufficient to eliminate the hazard from static electricity. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. No smoking. Avoid repeated and prolonged skin contact. Use personal protection measures as recommended in Section 8. Use only non-sparking tools. Do not cut, drill, grind or weld on empty containers since explosive residues may remain. Refer to applicable EPA, OSHA, NFPA and consistent state and local requirements.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignition of vapors or mists without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

Storage Conditions: Store in properly closed containers that are appropriately labeled and in a cool, well-ventilated area.

Incompatible materials Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Name	ACGIH TLV	OSHA PELS:	OSHA - Vacated PELs	NIOSH IDLH
Xylene (mixed isomers) 1330-20-7	100 ppm TWA 150 ppm STEL	TWA: 100 ppm TWA: 435 mg/m^3	100 ppm TWA 435 mg/m^3 TWA 150 ppm STEL 655 mg/m^3 STEL	900 ppm
Ethylbenzene 100-41-4	20 ppm TWA	TWA: 100 ppm TWA: 435 mg/m^3	100 ppm TWA 435 mg/m^3 TWA 125 ppm STEL 545 mg/m^3 STEL	800 ppm
Cumene 98-82-8	50 ppm TWA	TWA: 50 ppm TWA: 245 mg/m^3 Skin	50 ppm TWA 245 mg/m^3 TWA Limit applies to skin	900 ppm
Toluene 108-88-3	20 ppm TWA	TWA: 200 ppm Ceiling: 300 ppm	100 ppm TWA 375 mg/m^3 TWA 150 ppm STEL 560 mg/m^3 STEL	500 ppm

Notes: The manufacturer has voluntarily elected to provide exposure limits contained in OSHA's 1989 air contaminants standard in its SDSs, even though certain of those exposure limits were vacated in 1992.

Engineering measures: Local or general exhaust required in an enclosed area or when there is inadequate ventilation. Use mechanical ventilation equipment that is explosion-proof.

Personal protective equipment

Eye protection: Use goggles or face-shield if there is a potential for splashing.

Skin and body protection: Viton gloves should be used to prevent skin contact. Glove suitability is based on workplace conditions and usage. Contact the glove manufacturer for specific advice on glove selection and breakthrough times.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the established exposure limits. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 29 CFR 1910.134. Self-contained breathing apparatus should be used for fire fighting.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Liquid
Appearance	Clear Liquid
Color	Colorless
Odor	Sweet Aromatic
Odor Threshold	0.4 ppmv

Property	**Values (Method)**
Melting Point / Freezing Point	-45 °C / -49 °F
Initial Boiling Point / Boiling Range	138-142 °C / 280-288 °F
Flash Point	27 °C / 81 °F
Evaporation Rate	0.76 (Butyl Acetate = 1)
Flammability (solid, gas)	No available data.
Flammability Limit in Air (%)	
Upper Flammability Limit:	7.0
Lower Flammability Limit:	0.9
Vapor Pressure	No available data.
Vapor Density	3.66 (Air=1)
Specific Gravity / Relative Density	0.87
Water Solubility	Insoluble
Solubility in other solvents	No available data.
Partition Coefficient	3.12-3.20 Log Kow
Decomposition temperature:	No available data.
pH:	Not Applicable
Autoignition Temperature	465 °C / 869 °F
Kinematic Viscosity	0.79 cSt @ 20°C (ASTM D7042)
Dynamic Viscosity	No available data.
Explosive Properties	No available data.
Softening Point	Not Applicable
VOC Content (%)	No available data.
Density	7.25 lbs/gal
Bulk Density	Not applicable.

10. STABILITY AND REACTIVITY

Reactivity The product is non-reactive under normal conditions.

Chemical stability The material is stable at 70°F, 760 mmHg pressure.

Possibility of hazardous reactions None under normal processing.

Hazardous polymerization Will not occur.

Conditions to avoid Sources of heat or ignition.

Incompatible materials Strong oxidizing agents.

Hazardous decomposition products None known under normal conditions of use.

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

Inhalation May cause irritation of respiratory tract. May cause drowsiness or dizziness. Breathing high concentrations of this material, for example, in a confined space or by intentional abuse, can cause irregular heartbeats which can cause death.

Eye contact Irritating to eyes.

Skin contact Irritating to skin. Repeated exposure may cause skin dryness or cracking.

Ingestion May be fatal if swallowed or vomited and enters airways. May cause irritation of the mouth, throat and gastrointestinal tract.

Acute Toxicological data

Name	Oral LD50	Dermal LD50	Inhalation LC50
Xylene (mixed isomers) 1330-20-7	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.04 mg/L (Rat) 4 h
Ethylbenzene 100-41-4	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	17.2 mg/L (Rat) 4 h
Cumene 98-82-8	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 20 mg/L (Rat) 6 h
Toluene 108-88-3	> 2000 mg/kg (Rat)	8390 mg/kg (Rabbit)	12.5 mg/L (Rat) 4 h

Delayed and immediate effects as well as chronic effects from short and long-term exposure

XYLENES, ALL ISOMERS: Overexposure to xylene may cause upper respiratory tract irritation, headache, cyanosis, blood serum changes, nervous system damage and narcosis. Effects may be increased by the use of alcoholic beverages. Evidence of liver and kidney impairment were reported in workers recovering from a gross overexposure. Effects from Prolonged or Repeated Exposure: Impaired neurological function was reported in workers exposed to solvents including xylene. Studies in laboratory animals have shown evidence of impaired hearing following high levels of exposure. Studies in laboratory animals suggest some changes in reproductive organs following high levels of exposure but no significant effects on reproduction were observed. Studies in laboratory animals indicate skeletal and visceral malformations, developmental delays, and increased fetal resorptions following extremely high levels of maternal exposure with evidence of maternal toxicity. The relevance of these observations to humans is not clear at this time. Adverse effects on the liver, kidney, bone marrow (changes in blood cell parameters) were observed in laboratory animals following high levels of exposure. The relevance of these observations to humans is not clear at this time.

ETHYLBENZENE: Findings from a 2-year inhalation study in rodents conducted by NTP were as follows: Effects were observed only at the highest exposure level (750 ppm). At this level the incidence of renal tumors was elevated in male rats (tubular carcinomas) and female rats (tubular adenomas). The incidence of tumors was also elevated in male mice (alveolar and bronchiolar carcinomas) and female mice (hepatocellular carcinomas). IARC has classified ethyl benzene as "possibly carcinogenic to humans" (Group 2B). Studies in laboratory animals indicate some evidence of post-implantation deaths following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate limited evidence of renal malformations, resorptions, and developmental delays following high levels of maternal exposure with evidence of maternal toxicity. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals have demonstrated evidence of ototoxicity (hearing loss) following exposure levels as low as 300 ppm for 5 days. Studies in laboratory animals indicate some evidence of adverse effects on the liver, kidney, thyroid, and pituitary gland.

CUMENE: Overexposure to cumene may cause upper respiratory tract irritation and CNS depression. Studies in laboratory animals indicate evidence of respiratory tract hyperplasia, and adverse effects on the liver, kidney and adrenal glands following high level exposure. The relevance of these findings to humans is not clear at this time. Findings from lifetime laboratory rodent inhalation studies were as follows: In F344/N rats: an increased incidence of renal carcinomas and adenomas, respiratory epithelial adenomas, and interstitial cell adenomas of the testes. In B6C3F1 mice: an increased incidence of carcinomas and adenomas of the bronchi and lung, liver neoplasms, hemangiosarcomas of the spleen, and adenomas of the thyroid.

TOLUENE: Abuse of toluene at high concentrations (e.g., glue sniffing and solvent abuse) has been associated with adverse effects on the liver, kidney and nervous system, and can cause nervous system depression, cardiac arrhythmias, and death. Studies of workers indicate long-term exposure may be related to impaired color vision and hearing. Some studies of workers suggest long-term exposure may be related to neurobehavioral and cognitive changes. Some of these effects have been observed in laboratory animals following repeated exposure to high levels of toluene. Several studies of workers suggest long-term exposure may be related to small increases in spontaneous abortions and changes in some gonadotropic hormones. However, the weight of evidence does not indicate toluene is a reproductive hazard to humans. Studies in laboratory animals indicate some changes in reproductive organs following high levels of exposure, but no significant effects on mating performance or reproduction were observed. Case studies of persons abusing toluene suggest isolated incidences of adverse effects on the fetus including birth defects. Findings in laboratory animals have been largely negative. Positive findings include small increases in minor skeletal and visceral malformations and developmental delays following very high levels of maternal exposure. Studies of workers indicate long term exposure may be related to effects on the liver, kidney and blood, but these appear to be limited to changes in serum enzymes and decreased leukocyte counts. Adverse effects on the liver, kidney, thymus and nervous system were observed in animal studies following very high levels of exposure. The relevance of these findings to humans is not clear at this time.

Adverse effects related to the physical, chemical and toxicological characteristics

Signs & Symptoms Respiratory tract irritation. Nausea, vomiting, signs of nervous system depression: headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue.

Sensitization Not expected to be a skin or respiratory sensitizer.

Mutagenic effects None known.

Carcinogenicity Cancer designations are listed in the table below.

Name	ACGIH (Class)	IARC (Class)	NTP	OSHA
Xylene (mixed isomers) 1330-20-7	Not Classifiable (A4)	Not Classifiable (3)	Not Listed	Not Listed
Ethylbenzene 100-41-4	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Not Listed	Not Listed
Cumene 98-82-8	Not listed	Possible human carcinogen (2B)	Not listed	Not listed
Toluene 108-88-3	Not Classifiable (A4)	Not Classifiable (3)	Not Listed	Not Listed

Reproductive toxicity Suspected of damaging the unborn child.

Specific Target Organ Toxicity (STOT) - single exposure Respiratory system. Central nervous system.

Specific Target Organ Toxicity (STOT) - repeated exposure Nervous system. Auditory system.

Aspiration hazard May be fatal if swallowed or vomited and enters airways.

12. ECOLOGICAL INFORMATION

Ecotoxicity This product should be considered toxic to aquatic organisms, with the potential to cause long lasting adverse effects in the aquatic environment.

Name	Algae/aquatic plants	Fish	Toxicity to Microorganisms	Crustacea
Xylene (mixed isomers) 1330-20-7	72-hr EC50 = 11 mg/l Algae	96-hr LC50 = 8 mg/l Rainbow trout	-	48-hr LC50 = 3.82 mg/l Daphnia magna
Ethylbenzene 100-41-4	72-hr EC50 = 1.7-7.6 mg/l Algae	96-hr LC50 = 4 mg/L Rainbow trout	-	48-hr EC50 = 1-4 mg/L Daphnia magna
Cumene 98-82-8	72-hr EC50 = 2.6 mg/l Algae	96-hr LC50 = 6.04-6.61 mg/l Fathead minnow (Flow-through) 96-hr LC50 = 2.7 mg/l Rainbow trout (semi-static)	-	48-hr EC50 = 7.9-14.1 mg/l Daphnia magna (static)
Toluene 108-88-3	72-hr EC50 = 12.5 mg/l Algae	96-hr LC50 <= 10 mg/l Rainbow trout	-	48-hr EC50 = 5.46-9.83 mg/l Daphnia magna 48-hr EC50 = 11.5 mg/l Daphnia magna (Static)

Persistence and degradability Readily biodegradable in the environment.

Bioaccummulation Not expected to bioaccumulate in aquatic organisms.

Mobility in soil May partition into air, soil and water.

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Description of Waste Residues
This material may be a flammable liquid waste.

Safe Handling of Wastes
Handle in accordance with applicable local, state, and federal regulations. Use personal protection measures as required. Use appropriate grounding and bonding practices. Use only non-sparking tools. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. No smoking.

Disposal of Wastes / Methods of Disposal
The user is responsible for determining if any discarded material is a hazardous waste (40 CFR 262.11). Dispose of in accordance with federal, state and local regulations.

Methods of Contaminated Packaging Disposal
Empty containers should be completely drained and then discarded or recycled, if possible. Do not cut, drill, grind or weld on empty containers since explosive residues may be present. Dispose of in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

UN Proper shipping name:	Xylenes
UN/Identification No:	UN 1307
Transport Hazard Class(es):	3
Packing group:	III
DOT reportable quantity (lbs):	100 pounds.

TDG (Canada):

UN Proper shipping name:	Xylenes
UN/Identification No:	UN 1307
Transport Hazard Class(es):	3
Packing group:	III
Regulated substances:	100 pounds.

15. REGULATORY INFORMATION

US Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product does not contain any component(s) included on EPA's Extremely Hazardous Substance (EHS) List.

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Xylene (mixed isomers)	NA
Ethylbenzene	NA
Cumene	NA
Toluene	NA

SARA Section 304: This product may contain component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Xylene (mixed isomers)	100 lb final RQ 45.4 kg final RQ
Ethylbenzene	1000 lb final RQ 454 kg final RQ

Cumene	5000 lb final RQ 2270 kg final RQ
Toluene	1000 lb final RQ 454 kg final RQ

SARA: The following EPA hazard categories apply to this product:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard

SARA Section 313: This product may contain component(s), which if in exceedance of the de minimus threshold, may be subject to the reporting requirements of SARA Title III Section 313 Toxic Release Reporting (Form R).

Name	CERCLA/SARA 313 Emission reporting:
Xylene (mixed isomers)	1.0 % de minimis concentration
Ethylbenzene	0.1 % de minimis concentration
Cumene	1.0 % de minimis concentration
Toluene	1.0 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Xylene (mixed isomers)

Louisiana Right-To-Know:	Not Listed.
California Proposition 65:	Not Listed.
New Jersey Right-To-Know:	SN 2014
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold all isomers
Massachusetts Extraordinarily Hazardous Substances:	Not Listed.
California - Regulated Carcinogens:	Not Listed.
Pennsylvania RTK - Special Hazardous Substances:	Not Listed.
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 2014 TPQ: 500 lb
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

Ethylbenzene

Louisiana Right-To-Know:	Not Listed.
California Proposition 65:	Carcinogen, initial date 6/11/04
New Jersey Right-To-Know:	SN 0851
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed.
California - Regulated Carcinogens:	Not Listed.
Pennsylvania RTK - Special Hazardous Substances:	Not Listed.
New Jersey - Special Hazardous Substances:	Carcinogen; flammable - Third degree
New Jersey - Environmental Hazardous Substances List:	SN 0851 TPQ: 500 lb
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

Cumene

Louisiana Right-To-Know:	Not Listed.
California Proposition 65:	Carcinogen, initial date 4/6/10
New Jersey Right-To-Know:	SN 0542
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed.
California - Regulated Carcinogens:	Not Listed.
Pennsylvania RTK - Special Hazardous Substances:	Not Listed.
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0542 TPQ: 500 lb
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	5000 lb RQ (air); 1 lb RQ (land/water)

Toluene

Louisiana Right-To-Know:	Not Listed.
California Proposition 65:	Developmental toxicity, initial date 1/1/91 Female reproductive toxicity, initial date 8/7/09
New Jersey Right-To-Know:	SN 1866
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold
Massachusetts Extraordinarily Hazardous Substances:	Not Listed.
California - Regulated Carcinogens:	Not Listed.
Pennsylvania RTK - Special Hazardous Substances:	Not Listed.
New Jersey - Special Hazardous Substances:	Flammable - third degree; Teratogen
New Jersey - Environmental Hazardous Substances List:	SN 1866 TPQ: 500 lb
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Canadian Regulatory Information: "This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the (M)SDS contains all the information required by the Controlled Products Regulations."

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Xylene (mixed isomers)	B2,D2A,D2B	m-, o-isomers 1.0%; p-isomer 0.1%
Ethylbenzene	B2,D2A,D2B	0.1%
Cumene	B2,D2A	0.1%
Toluene	B2,D2A,D2B	0.1%

NOTE: Not Applicable.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety
Revision Date: 05/14/2015

Revision Note:

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is intended as guidance for safe handling, use, processing, storage, transportation, accidental release, clean-up and disposal and is not considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

Revision: 12 August 2015 SDS No.: YUB440(ENG) Version number: 3

SECTION 1: Identification of the substance/mixture and company/undertaking

1.1 Product identifier

YUBASE 4 plus
REACH registration number
01-2119484627-25-0042

1.2 Relevant identified uses of the substance or mixture and uses advised against

Mineral base oil.
Uses advised against: not available.

1.3 Details of the supplier of the safety data sheet

SK Lubricants Co. Ltd.,
26 Jong-ro Jongno-gu
Seoul
110-728, South Korea

Phone: +82 2 2121 7755
Email: Andy.Yoon@sk.com

SK Lubricants Americas
1300 Post Oak Blvd., Suite 450
Houston, TX 77056

Tel: 713-341-5844
Mobile: 713-397-1663
Sean Seo: oksh@sk.com

Local Chemical Emergency Contact

Spill Leak Fire Exposure or Accident
Call CHEMTREC Day or Night
DOMESTIC NORT AMERICA 800-424-9300
INTERNATIONAL, CALL +1-703-527-3887 (collect calls accepted)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008: Asp Tox 1, H304.

Classification according to Directive 1999/45/EC: Not classified

2.2 Label elements

Signal word: Danger

Hazard statements: May be fatal if swallowed and enters airways.

Precautionary statements

- prevention: IF SWALLOWED: Immediately call a POISON CENTER or doctor. Do NOT induce vomiting.
- response: None.
- storage: None.
- disposal: Dispose of contents/container to recycling or incineration in accordance with local/national regulation.

Supplemental: None.

SAFETY DATA SHEET

information

2.3 Other hazards Not available.

SECTION 3: Composition/information on ingredients

3.1 Substances [a]

Declarable components	*Conc. (wt%)*	*EC No.*	*CAS No.*
Distillates (petroleum) hydrotreated heavy paraffinic [a]	100	265-157-1	64742-54-7
Other components			
Not available			

[a] The DMSO extract by IP 346 of this substance is less than 3% (typical 0.2% with maximum 0.5%). Consequently it is not classified as a carcinogen.

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation

Inhalation at ambient temperature is unlikely because of the low vapour pressure of the substance.

In case of symptoms arising from inhalation of fumes, mists or vapour, remove casualty to a quiet and well ventilated place if safe to do so.

If the casualty is unconscious and:

- Not breathing: ensure that there is no obstruction to breathing and give artificial respiration by trained personnel. If necessary, give external cardiac massage and obtain medical assistance.

- Breathing: place in recovery position. Administer oxygen if necessary. Obtain medical assistance if breathing remains difficult.

Skin

Remove contaminated clothing and footwear, and dispose of safely.

Wash affected area with soap and water.

Seek medical attention if skin irritation, swelling or redness develops and persists.

When using high-pressure equipment, injection of product can occur. If high-pressure injuries occur, immediately seek professional medical attention. Do not wait for symptoms to develop.

For minor thermal burns: cool the burn. Hold the burned area under cold running water for at least five minutes, or until the pain subsides. However, body hypothermia must be avoided.

Do not put ice on the burn. Remove non-sticking garments carefully. DO NOT attempt to remove portions of clothing glued to burnt skin but cut round them.

Seek medical attention in all cases of serious burns

Eye

May cause burn in case of contact with product at high temperature.

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.

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If irritation, blurred vision or swelling occurs and persists, seek medical attention.

If hot product is splashed into the eye, it should be cooled immediately to dissipate heat, under cold running water. Immediately obtain specialist medical assessment and treatment for the casualty.

Ingestion

Always assume that aspiration has occurred. Seek professional medical attention or send the casualty to a hospital. Do not wait for symptoms to develop.

Product is as an aspiration hazard, and swallowing may lead to lung damage. Even small amounts of product aspirated into the lung require medical evaluation and treatment. **Do not** induce vomiting. **Do not** give anything to drink.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation: irritation of the respiratory tract due to excess fumes, mists or vapour exposure.

Skin: dry skin or irritation may arise in case of repeated or prolonged exposure. May cause burns in case of contact with product at high temperature.

Eye: slight irritation (unspecific).

Ingestion: for acute toxicity, few or no symptoms expected, e.g. nausea and diarrhoea. However, product is an aspiration hazard. Aspiration of low viscosity liquids into the lungs is a serious, potentially fatal, event. Aspiration may be recognized from the history of events, a smell of hydrocarbons on the breath, signs of vomiting or symptoms such as choking or coughing.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptoms as they occur.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable

- Foam (specifically trained personnel only).
- Water fog (specifically trained personnel only).
- Dry chemical powder.
- Carbon dioxide.
- Other inert gases (subject to regulations).
- Sand or earth.

Unsuitable

Do not use direct water jets on the burning product as they could cause splattering and spread the fire.

Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

5.2 Special hazards arising from the substance or mixture

Not classified as flammable, but will burn if involved in a fire.

During a fire, incomplete combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates and gases, including carbon monoxide and unidentified organic and inorganic compounds.

5.3 Advice for firefighters

Remove containers from fire or cool them with water spray.

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In case of a large fire or in confined or poorly ventilated spaces wear full fire resistant protective clothing and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Stop or contain leak at the source if safe to do so. Avoid direct contact with released material. Stay upwind.

Keep unauthorised personnel away from the area of spillage. Alert emergency personnel.

Except in case of small spillages, the feasibility of any actions should always be assessed and advised, if possible, by a trained, competent person in charge of managing the emergency.

It is recommended to eliminate all ignition sources if safe to do so (e.g. electricity, sparks, fires, flares).

If required, notify relevant authorities according to all applicable regulations.

Personal Protection Equipment for Emergency Responders:

Small spillages: normal antistatic working clothes are usually adequate. Large spillages: full body suit of chemically resistant and antistatic material.

Work gloves providing adequate chemical resistance, specifically to aromatic hydrocarbons. Note: gloves made of PVA are not water-resistant, and are not suitable for emergency use.

Work helmet. Antistatic non-skid safety shoes or boots.

Goggles or face shield, if splashes or contact with eyes is possible or anticipated.

Respiratory protection will be necessary only in special cases (e.g. formation of mists). A half or full-face respirator with combined dust/organic vapour filter(s), or a self-contained breathing apparatus (SCBA) can be used according to the extent of spill and predictable amount of exposure. If the situation cannot be completely assessed, or if an oxygen deficiency is possible, only SCBAs should be used.

6.2 Environmental precautions

Prevent product from entering sewers, rivers, waterways or other bodies of water.

6.3 Methods and material for containment and cleaning up

Land Spillage:

If necessary dike the product with dry earth, sand or similar non-combustible materials.

Large spillages may be cautiously covered with foam, if available, to limit fire risk. Do not use direct jets.

When inside buildings or confined space, ensure adequate ventilation.

Absorb spilled product with suitable non-combustible materials.

Collect free product by suitable means. Transfer collected product and other contaminated materials to suitable tanks or containers for recycle, recovery or safe disposal.

In case of soil contamination, remove contaminated soil for remediation or disposal according to local regulations.

Spillages in Water or at Sea:

In case of small spillages in closed waters (i.e. ports), contain product with floating barriers or other equipment. Collect spilled product by absorbing with specific floating absorbents.

If possible, large spillages in open waters should be contained with floating barriers or other mechanical means. If this not possible, control the spreading of the spillage, and collect the product by skimming or other suitable mechanical means.

The use of dispersants should be advised by an expert, and, if required, approved by local authorities.

Collect recovered product and other contaminated materials in suitable tanks or containers for recovery or safe disposal.

Additional Information:

Recommended measures are based on the most likely spillage scenarios for this material; however, local conditions (wind, air temperature, wave/current direction and speed) may significantly influence the choice of appropriate actions. For this reason, local experts should be consulted when necessary. Local regulations may also prescribe or limit actions to be taken.

6.4 Reference to other sections

For recommended personal protective equipment, see Section 8.

For disposal considerations, see Section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Ensure that all relevant regulations regarding handling and storage facilities of combustible products are followed.

It is recommended to keep away from sparks/open flames/hot surfaces. – No smoking. Take precautionary measures against static electricity.

Avoid splash filling of bulk volumes when handling hot liquid product.

Use and store only outdoors or in a well-ventilated area.

Avoid contact with skin. Avoid breathing fume/mist.

Use personal protective equipment as required.

Prevent the risk of slipping.

Avoid release to the environment.

7.2 Conditions for safe storage, including any incompatibilities

Storage area layout, tank design, equipment and operating procedures must comply with the relevant European, national or local legislation.

Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills.

Cleaning, inspection and maintenance of internal structure of storage tanks must be done only by properly equipped and qualified personnel as defined by national, local or company regulations.

Store separately from oxidizing agents.

Recommended materials: for containers, or container linings use mild steel, or stainless steel.

Unsuitable materials: some synthetic materials may be unsuitable for containers or container linings, depending on the material specification and intended use. Compatibility should be checked with the

manufacturer.

If the product is supplied in containers:

- Keep only in the original container or in a suitable container for this kind of product.

- Keep containers tightly closed and properly labelled.

- Empty containers may contain combustible product residues. Do not weld, solder, drill, cut or perform similar operations unless they have been properly cleaned.

Hygiene Measures:

Ensure that proper housekeeping measures are in place.

Contaminated materials should not be allowed to accumulate in the workplaces and should never be kept inside the pockets.

Keep away from food and beverages.

Do not eat, drink or smoke when using this product.

Wash hands thoroughly after handling.

Change contaminated clothes at the end of working shift.

Load/unload temperature: ambient.

Storage temperature: ambient.

7.3 Specific end use(s) Not available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

EU limit values	None.
UK limit values	None.
Monitoring procedure	Not applicable.
Other: human health (DNELs, DMELs)	Not available.
Other: environmental (PNEC)	Distillates (petroleum), hydrotreated heavy paraffinic: PNEC: oral, 9.33 mg/kg food.

8.2 Exposure controls

Engineering controls	Good general ventilation is recommended for handling the product. For processing, where mist or vapour might be formed, local exhaust ventilation or use in a closed system is recommended. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present.
Personal protective equipment	The need for personal protective equipment should be based on a workplace risk assessment for the particular use. No special respiratory protection is normally required. Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Normal industrial eye protection practices should be employed.

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	Wear suitable gloves (nitrile gloves are recommended) to avoid direct skin contact. PPE should be to national standards. Consult manufacturers concerning breakthrough times.
Environmental exposure controls	Not available.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	Water white liquid
Odour	Characteristic, mineral oil
Odour threshold	Not established
pH	Not applicable
Melting/freezing point	Not established
Initial boiling point/range	340–500 °C
Flash point	220 °C (Cleveland open cup)
Evaporation rate	Not established
Flammability (solid, gas)	Not applicable
Flamm. or expl. limits	Not established
Vapour pressure	<0.01 kPa
Vapour density	>5 (air = 1)
Relative density	0.825 (water = 1)
Solubilities	Water: negligible
Partition coeff. (K_{ow})	Expected to be >7
Auto-ignition temp.	> 290 °C
Decomposition temp.	Not established
Viscosity	19 cSt at 40 °C
Explosive properties	Not available
Oxidising properties	Not available

9.2 Other information Not available

SECTION 10: Stability and reactivity

10.1 Reactivity Not available.

10.2 Chemical stability Stable under normal temperature and pressure.

10.3 Possibility of hazardous reactions No hazardous polymerisation.

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10.4 Conditions to avoid	Extreme heat.
10.5 Incompatible materials	Strong oxidizing agents.
10.6 Hazardous decomposition products	Incomplete combustion gives toxic gas mixture, including carbon monoxide.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity	Based on available data, the classification criteria are not met. LD_{50} (oral), > 5000 mg/kg; LC_{50} (inhalation), > 5.0 mg/L; LD_{50} (dermal, rat), > 2000 mg/kg (practically non-toxic).
Skin corrosion/irritation	Only weakly irritating or non-irritating to the skin of rabbits and humans.
Serious eye damage/irritation	Practically non-irritating.
Respiratory or skin sensitisation	Respiratory: not expected to cause respiratory sensitization. Skin: based on available data, the classification criteria are not met.
Germ cell mutagenicity	This substance was found to be non-mutagenic.
Carcinogenicity	Based on available data, the classification criteria are not met.
Reproductive toxicity	Based on available data, the classification criteria are not met. Reproductive toxicity dermal NOAEL (development) > 2000 mg/kg. This substance showed no effects on reproductive parameters.
STOT-single exposure	Not classified due to lack of data.
STOT-repeated exposure	Based on available data, the classification criteria are not met. Sub-chronic repeat dose, dermal: NOAEL 1000 mg/kg. Sub-chronic repeat dose, inhalation: NOAEL (local effects) > 220 mg/m^3 and NOAEL (systemic effects) > 980 mg/m^3.
Aspiration hazard	Meets the criteria for classification (Category 1).

SECTION 12: Ecological information

12.1 Toxicity	Product is not classified as harmful to aquatic organisms. Acute aquatic invertebrate EL_{50} > 10 000mg/L. Acute aquatic algae NOEL > 100 mg/L. Acute fish LL_{50} > 100 mg/L. Long-term invertebrate NOEL 10mg/L. Long-term fish NOEL 10mg/L.
12.2 Persistence and degradability	Not readily biodegradable, but inherently biodegradable (ca. 30% degradation in 28 d (method OECD 301 F).
12.3 Bioaccumulative potential	Not available
12.4 Mobility in soil	Not available.

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12.5 Results of PBT and vPvB assessment	Not available.
12.6 Other adverse effects	The product is a water-insoluble oil, and may form a sheen or film on water.

SECTION 13: Disposal considerations

13.1 Waste treatment methods	Incineration or recycling is recommended for disposal of this product. This product is not suitable for landfill or disposal via the drains. Disposal must be in accordance with current national and local regulations. Chemical residues generally count as special waste. General EU requirements are given in Directive 2008/98/EC, including procedures for the disposal of waste oils. Wastes of this product are covered in the European Waste Catalogue, suggested code 13 02 05, mineral-based non-chlorinated, engine, gear and lubricating oils. The hazards of the waste may differ from that of the product, and it is the responsibility of the waste generator to identify hazards and dispose wastes in compliance with applicable regulations.

SECTION 14: Transport information

14.1 UN Number	Not classified as dangerous goods for transport.
14.2 UN proper shipping name	Not applicable.
14.3 Transport hazard class(es)	Not applicable.
14.4 Packing group	Not applicable.
14.5 Environmental hazards	Not classified as marine pollutant/environmentally hazardous.
14.6 Special precautions for user	Not available.
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture	*UK*: Workplace Exposure Limits EH40/2005, with 2007 supplement, Health and Safety Executive; Control of Substances Hazardous to Health Regulations 2002 (COSHH), as amended.
15.2 Chemical safety assessment	Not available.

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SECTION 16: Other information

Revisions	This SDS is the first version in EU format, using classification according to the CLP Regulation.
Abbreviations	DNEL, derived no-effect level; DMEL, derived minimum effect level; EL, effect level; LC, lethal concentration; LD, lethal dose; NOAEL, no-observed-adverse-effect level; NOEL, no-observed-effect level; OECD, Organisation for Economic Co-operation and Development; PBT, persistent, bioaccumulative, and toxic; vPvB, very persistent, very bioaccumulative.
References	Annex VI of Regulation 1272/2008 on *Harmonised Classification and Labelling for Certain Hazardous Substances* (CLP Regulation). Information on Registered Substances; Chemical Substance Search; European Chemicals Agency (ECHA), available at the ECHA website: http://echa.europa.eu. Supplier safety data sheet.
Basis of classification	The recommendations presented in this Safety Data Sheet were obtained from actual test data when available, comparison with similar products, component information from suppliers and from recognized codes of good practice.
List of R-phrases	R65, harmful: may cause lung damage if swallowed.
List of hazard statements	H304: May be fatal if swallowed and enters airways.

Disclaimer:

The data and recommendation presented herein are based on our research and the research of others, and are believed to be accurate. No guarantee of their accuracy is made, however, and the products discussed are distributed without warranty, express or implied, and the person receiving them small make his own determination of the suitability thereof for his particular purpose.

NRC	**SAFETY MANAGEMENT SYSTEM**	TEAM SAFETY IT'S THE WAY TO GO!
Form 3.1.1	Root Cause Analysis – Personal Injury / Incident Report (To Be filled out by PROJECT/SAFETY MANAGER at Time of Incident)	Revision: 01/2016

PROJECT INFORMATION		
1. CLIENT NAME:	2. PROJECT NUMBER:	
3. PROJECT MGR/PHONE:	4. SUPERVISOR/PHONE:	
INJURED EMPLOYEE INFORMATION		
5. EMPLOYEE:	6. JOB TITLE:	
7. BRANCH OFFICE:	8. DATE OF HIRE:	9. PHONE:
10. EMPLOYEE STATUS: ☐ Regular-Full Time ☐ Regular Part-Time ☐ Temporary ☐ Seasonal		

INCIDENT INFORMATION			
11. DATE OF INCIDENT: ____/____/____ MO DAY YR 12. TIME OF INCIDENT ____:____ HR MIN	13. TIME EMPLOYEE BEGAN WORK: (24 Hour Clock) ____:____ HR MIN	14. DAY OF WEEK: ☐ Sun ☐ Thu ☐ Mon ☐ Fri ☐ Tue ☐ Sat ☐ Wed	15. WEATHER AT TIME OF INCIDENT: ☐ Clear ☐ Ice/Snow ☐ Cloudy ☐ Raining ☐ Dark ☐ N/A ☐ High Wind/Rough Sea

16. LOCATION OF INCIDENT:	17. EMPLOYEE DUTY AT TIME OF INCIDENT:
18. DATE / TIME INCIDENT REPORTED:	19. INCIDENT REPORTED TO:
20. WAS HEALTH & SAFETY NOTIFIED? ☐ Yes ☐ No	21. SAFETY MGR:
22. WHAT WAS THE EMPLOYEE DOING JUST BEFORE THE INCIDENT OCCURRED?	
23. DESCRIBE THE INCIDENT:	
24. WHAT OBJECT (I.E. TOOL, EQUIPMENT, MATERIAL OR SUBSTANCE) DIRECTLY HARMED THE EMPLOYEE/PROPERTY?	
25. WITNESSES TO THE INCIDENT: ☐ YES If yes, Provide names and contact numbers ☐ NO	
26. SUPERVISION AT TIME OF INCIDENT:	☐ Directly supervised ☐ Not supervised

MEDICAL TREATMENT	
27. PART OF BODY INJURED:	28. MEDICAL TREATMENT: ☐ None ☐ First Aid ☐ Ambulance ☐ Driven to Clinic / Hospital
29. DID EMPLOYEE STOP WORK BECAUSE OF INJURY? ☐ Yes (Date / time:) ☐ No	
30. DID EMPLOYEE REFUSE TREATMENT/EXAM? ☐ Yes (Employee Initial) ☐ No	
31. HAS EMPLOYEE RETURNED TO WORK? ☐ Yes ☐ No	
32. NAME / ADDRESS / PHONE # HOSPITAL/CLINIC:	33. NAME / PHONE NUMBER PHYSICIAN:
34. WAS EMPLOYEE HOSPITALIZED OVERNIGHT? ☐ Yes	No

NRC	**SAFETY MANAGEMENT SYSTEM**	TEAM SAFETY IT'S THE WAY TO GO!
Form 3.1.1	Root Cause Analysis – Personal Injury / Incident Report (To Be filled out by PROJECT/SAFETY MANAGER at Time of Incident)	Revision: 01/2016

PROPERTY DAMAGE
35. LIST EQUIPMENT/VEHICLE UNIT #:
36. MAKE/MODEL/YEAR:
37. LOCATION OF DAMAGE:
38. DEGREE OF DAMAGE:
POST ACCIDENT D & A
39. INCIDENT CLASSIFICATION: ☐ DOT ☐ Non DOT
40. POST ACCIDENT DRUG TESTING ☐ Yes –Unsafe Actions of Employee ☐ No –Unsafe Condition / not caused by employee
41. ROOT CAUSE ANALYSIS – PM/Supervisor check all contributing factors that apply to this incident

At Risk Acts		Unsafe Conditions		Other Factors	
AR1	Using unsafe/non-approved equipment	UC1	Poor equipment design	OF1	
AR2	Improper work technique	UC2	Unsafe operation method		
AR3	Safety rule / plan violation	UC3	Improper maintenance	OF2	
AR4	Improper PPE or PPE not used	UC4	Lack of direct supervision		
AR5	Operating without authority	UC5	Insufficient training	OF3	
AR6	Failure to warn or secure/lockout	UC6	Lack of experience		
AR7	Operating at improper speeds/driving error	UC7	Insufficient knowledge of job	OF4	
AR8	By-passing safety devices	UC8	Slippery conditions		
AR9	Protective equipment not in use	UC9	Excessive exposure	OF5	
AR10	Improper lifting/carrying	UC10	Inadequate guarding of hazards		
AR11	Servicing machinery in motion	UC11	Defective tools/equipment	OF6	
AR12	Horseplay	UC12	Poor housekeeping		
AR13	Failure to get assistance	UC13	Insufficient lighting	OF7	AR14 UC14

42. ROOT CAUSE SOLUTIONS TO PREVENT FROM RECURRING

ROOT CAUSE #	SOLUTIONS / RECOMMENDATIONS	PERSON RESPONSIBLE TO FIX	DUE DATE

43. FOLLOW-UP / CORRECTIVE ACTIONS

☐ Safety Work Order
☐ Equipment taken out of service
☐ Stand-down of crew to discuss incident
☐ Follow-up with NRC Safety Manager _____
☐ Safety Alert_____

44. WHAT CORRECTIVE ACTIONS WERE TAKEN TO PREVENT RE-OCCURRENCE OF THIS INCIDENT?

45. INCIDENT REPORT PREPARED BY:

Name_____ Title_____

Department Date

NRC	**SAFETY MANAGEMENT SYSTEM**	TEAM SAFETY IT'S THE WAY TO GO!
Form 3.1.2	Employee Occupational Injury / Incident Report (To Be Filled Out By EMPLOYEE At Time Of Incident)	Revision: 06/2018

EMPLOYEE_____ Office Assigned _____

Home Address _____

Telephone____/_____ SS# XXX/XX/_____ Date of Birth____/____/____

DATE OF INJURY ____/____/____ MO DAY YR

TIME OF INJURY (24-hr clock) ____/____ HR MIN

SHIFT: ☐ Day ☐ Swing ☐ Graveyard

DAY OF WEEK: ☐ Sun ☐ Mon ☐ Tue ☐ Wed ☐ Thu ☐ Fri ☐ Sat

Hours Worked _____

REPORTED TO ☐ Supervisor ☐ Other _____

Incident Location Address_____ Client Name _____

Job Title _____ Date of Hire _____ Time on this job _____

PART OF BODY AFFECTED: Check Box (es)

Head & Neck	Upper Extremities-Rt	Upper Extremities-Lt	Trunk	Lower Extremities- Rt	Lower Extremities-Lt
☐ Scalp	☐ Shoulder	☐ Shoulder	☐ Upper Back	☐ Thigh	☐ Thigh
☐ Skull	☐ Upper Arm	☐ Upper Arm	☐ Lower Back	☐ Lower Leg	☐ Lower Leg
☐ Neck *Circle one*	☐ Elbow	☐ Elbow	☐ Chest	☐ Knee	☐ Knee
☐ Ear(s) Rt Lt Both	☐ Forearm	☐ Forearm	☐ Abdomen	☐ Ankle	☐ Ankle
☐ Eye(s) Rt Lt Both	☐ Wrist	☐ Wrist	☐ Hip(s)	☐ Foot	☐ Foot
☐ Mouth	☐ Hand	☐ Hand	☐ Groin	Toe(s)	Toe(s)
☐ Teeth	Finger(s)	Finger(s)	Side		
Face					

NATURE OF INJURY: Check Box (es)

☐ Laceration	☐ Puncture	☐ Gradual Onset	☐ Foreign Body, Imbedded	
☐ Abrasion	☐ Hernia	☐ Strain	☐ Foreign Body	☐ Amputation
☐ Burn, Chemical	☐ Dermatitis	☐ Bruise	☐ Fracture	☐ Fatality
☐ Burn, Thermal	☐ Electrocution	☐ Sprain	☐ Infection	

SEVERITY OF INJURY: Check Box (es)

☐ First Aid	☐ Return-to-Work Same Day	☐ Other_____	Transported by:
☐ Sent to Doctor	☐ Unable to Work Next Shift_____		☐ Ambulance
☐ Hospitalized	☐ Work Restrictions (s)	_____	☐ Car
☐ Unconscious	☐	_____	☐ Other_____
☐ Sutured or Stitched			☐ Accompanied by_____

Sequence of Events: (be specific, including why actions occurred or conditions existed) _____

_____

_____

_____

_____

Names of Witnesses: _____

_____

Suggestion of employee to prevent recurrence: _____

_____

_____

Signatures:

_____ _____ _____ _____

Employee Date Supervisor Date

1.0 PURPOSE

The purpose of this procedure is to establish confined space entry standards for all NRC (including NRC West, East, Compliance, SRS, Alaska, et al.) employees and subcontractors. This procedure exceeds the guidelines contained in the Occupational Safety and Health Administration (OSHA) Permit-required Confined Spaces standard 29 CFR 1910.146 and requirements outlined in Cal OSHA Article 108 -5157.

NRC shall enforce this procedure as a means of protecting the health and safety of workers while entering, working in, and exiting confined spaces. Before entry, the worker will be made aware of the hazards of confined space work and the safe work practices necessary.

Employees are solicited for input regarding the confined space program or any elements of it. This input can be provided during training classes or on actual confined space job sites.

2.0 DEFINITIONS

2.1 Acceptable entry conditions**:** The conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

2.2 Alternate Procedures: NRC will not use “alternate procedures” as a means of entering a space under non-permit required conditions. All spaces, regardless of classification will require entry under the protection of a confined space permit.

2.3 Attendant**:** An individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

2.4 Authorized entrant**:** An employee who is authorized by the employer to enter a permit space.

2.5 Classification of Confined Spaces

NRC evaluates all confined spaces for potential hazards; however all spaces are considered permit-required confined spaces; specifically a permit will be used for all confined space entries.

2.6 Confined Space**:** A space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and

(3) Is not designed for continuous employee occupancy.

2.7 Entry: The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

2.8 Entry permit (permit): The written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in paragraph (f) of this section.

2.9 Entry supervisor: The person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section. An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

2.10 Hazardous atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

(1) Flammable gas, vapor, or mist in excess of 10 percent of its lower explosion limit (LEL);

(2) Airborne combustible dust at a concentration that meets or exceeds its Lower Flammable Limit (LFL);

(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of 29 CFR 1910 and which could result in employee exposure in excess of its dose or permissible exposure limit;

(5) Any other atmospheric condition that is immediately dangerous to life or health.

2.11 Immediately dangerous to life or health (IDLH): Any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space. **(Note: in virtually all instances, spaces that are 10% LFL or below, may still be in excess of the IDLH for that substance.)**

2.12 Oxygen deficient atmosphere: An atmosphere containing less than 19.5 percent oxygen by volume.

2.13 Oxygen enriched atmosphere: An atmosphere containing more than 23.5 percent oxygen by volume.

2.14 Permit-required confined space (permit space): A confined space that has one or more of the following characteristics:

(1) Contains or has a potential to contain a hazardous atmosphere;

(2) Contains a material that has the potential for engulfing an entrant;

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section;

(4) Contains any other recognized serious safety or health hazard;

(5) NRC considers all confined spaces as permit required.

2.15 Rescue service: The personnel designated to rescue employees from permit spaces.

2.16 Retrieval system: The equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

2.17 Testing: The process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

3.0 RESPONSIBILITIES

Designated employees will be listed by name for each position or responsibility including: attendant, authorized entrants, entry supervisor and air monitor.

3.1 Attendants shall:

- Know the hazards that may be faced during entry in the permit-required confined space, including the signs, symptoms and consequences of over-exposure;
- Be aware of possible behavioral effects of hazard exposure to the entrants;
- Continuously maintain an accurate count of authorized entrants;
- Remain outside the permit-required confined space during entry operations until relieved by another attendant. A single attendant will NOT monitor multiple spaces;
- Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space if necessary;
- Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and order the authorized entrants to evacuate the permit-required confined space immediately if necessary;
- Summon rescue and other emergency services if necessary;
- Take the appropriate actions when unauthorized persons approach or enter a permit space while entry is underway;
- Perform non-entry rescues as specified by this procedure;

- Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

3.2 Authorized entrants shall:

- Know the hazards that may be faced during entry, including information on the route of entry, signs or symptoms, and consequences of the exposure;

- Properly use the required equipment;

- Communicate with the attendant, as necessary, to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate as necessary;

- Alert the attendant whenever the entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or the entrant detects a prohibited condition;

- Exit from the permit-required confined space as quickly as possible whenever:

(1) An order to evacuate is given by the attendant or the entry supervisor;

(2) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation;

(3) The entrant detects a prohibited condition; or

(4) An evacuation alarm is activated.

3.3 Entry Supervisors shall:

- Perform a Hazard Assessment of all Confined Spaces before employees enter them. Entry Supervisors shall identify and evaluate the hazards that may be faced during entry, including information on the routes of entry, signs or symptoms, and consequences of the exposure. This assessment shall be conducted and documented before employees enter;

- Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but

not limited to, the following: (A) Specifying acceptable entry conditions; (B) Isolating the permit space; (C) Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards; (D) Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards; and (E) Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry;

- Verify, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

- Terminate the entry and cancel the permit when entry operations covered by the permit are complete or when a prohibited condition arises in or near the space;

- Verify that the NRC rescue plan is complete and that proper equipment / trained employees are available;

- Take the following actions when unauthorized persons approach or enter a permit space while entry is underway: (A) Warn unauthorized persons that they must stay away from the permit space; (B) Advise unauthorized persons that they must exit immediately if they have entered the permit space; and (C) Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

- Determines that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

4.0 RESCUE SERVICES

4.1 Rescue Plan

Prior to any confined space work, a site-specific written rescue plan will be developed that addresses minimum requirements. The rescue plan will be addressed on the confined space permit and covered with the entrants prior to initial entry.

4.2 Basic Rescue Requirements

4.2.1 NRC Entry Supervisor shall ensure that at least one standby personnel at the site is trained and immediately available to perform rescue and emergency services.

4.2.2 A trained attendant will be assigned to each confined space with a fully charged SCBA or airline and egress unit in the event that monitoring indicates Oxygen deficient or atmospheres >PELs. The attendant is to keep life lines clear, to maintain contact with all workers within the confined space and to summon help if needed.

4.2.3 If Fire Department rescue teams will be utilized, the supervisor must ensure that the rescue team has been contacted in advance and has the capability to perform a rescue. The Fire Department teams must be provided the opportunity to examine the rescue site, practice a rescue and decline if appropriate.

It should be understood, that the time required to recognize the need for rescue, to contact the fire department and allow them to safely perform the rescue may require at least 45 minutes. For this reason, any rescue plan should be realistic. It should be noted that in many states or cities, Fire Department rescue is not an option.

4.2.4 The equipment required to rescue an unconscious victim must be in place before the first person enters the confined space. This means that personnel must be wearing harnesses, and rescue tripod /winch is set-up and operational.

4.2.5 Client Host Rescue Service

If the confined space rescue plan relies upon the client host to provide the rescue, this must be specifically stated and agreed to in attached contract language.

4.2.6 NRC Entry Supervisor shall ensure that each member of the rescue service is provided with, and is trained to use properly, the personal protective equipment and rescue equipment necessary for making rescues from permit spaces on an annual basis.

4.2.7 Training Requirements for Rescue Team Members

- Each member of the rescue service must have been trained to perform the assigned rescue duties.
- Each member of the rescue service must also receive the training required of authorized entrants.

- Each member of the rescue service must practice making permit space rescues at least once every 12 months by means of a simulated rescue operation (i.e. remove dummies, manikins or actual persons) from spaces representative of the type they may encounter.

- Each member of the rescue team shall be trained in basic first-aid, cardiopulmonary resuscitation. At least one member of the rescue service holding a current certification in First Aid shall be available on the team.

4.3 Entry Rescue Procedures

4.3.1 Entry rescue procedures should be specifically designed for each permit-required confined space and should be included, where applicable, in the written site health and safety plan. The rescue plan shall:

- Include provisions for emergency communication;

- State how the rescue team and other emergency services will be summoned to the site;

- State what level of personal protective equipment is necessary for rescue operations;

- State what other types of equipment may be needed, including escape personal protective equipment for injured entrant(s), if necessary.

4.3.2 Attendants may perform entry rescue operations only if properly trained **and** if relieved of the attendant duties by another qualified attendant.

4.3.3 IDLH / Inert Conditions

It is the policy of NRC that personnel do not enter IDLH situations for work or rescue. Ventilation will be used to eliminate IDLH conditions and non-entry rescue procedures will be used to extract personnel. In the extreme event that NRC employees must enter an inert space for rescue, the following additional procedures will be initiated:

4.3.3.1 Special training will be provided for all employees whose duties include working in or around an inert space.

4.3.3.2 A Job Site Analysis will be written specific to the vessel being entered and the work undertaken. The JSA will address all risks associated with the task such as: setting up the inert entry and catalyst handling equipment at the work site, access and egress to the equipment, provisions for adequate lighting, control of employee access, lifting and rigging activities, removal of vessel internals and installation of warning signs.

4.3.3.3 The NRC Confined Space Supervisor will communicate the JSA to involved contractor personnel.

4.3.3.4 NRC will have a documented heat stress plan, including a work/rest regiment, based on the ACGIH Threshold Limit Values.

4.3.3.5 Inert entry requires specialized equipment. Ensure it is inspected and in good working order before initiating entry.

4.3.3.6 Personnel must maintain a communication system for use by the employees working inside the inert atmosphere and those monitoring the work from the outside. Entry system must be capable of simultaneous communication with all entry and support personnel. If for any reason the primary communication link fails, the persons working inside the space must be evacuated.

4.3.3.7 Entrants must wear a helmet sufficiently secured to prevent inadvertent removal (example of a clam type helmet with integral breathing air).

4.3.3.8 Air supply must be Certified Grade D quality breathing air and must be checked and tagged by the Safety Manager before use at the site. Only bottled air is permitted, i.e. no ‘rebreathers’.

4.3.3.9 The entrant must wear an auxiliary escape air bottle in addition to supplied air. Ensure that the escape bottle is turned off to prevent supplied air flowing through it.

4.3.3.10 NRC Confined Space Supervisor will write an emergency plan.

4.3.3.11 The emergency plan must include, but is not limited to the following elements: loss of Nitrogen supply, high Nitrogen pressure, high vessel oxygen, high/increasing vessel temperature, loss of breathing air supply, emergency inside the vessel, and plant emergency outside the vessel.

4.3.3.12 Stand by NRC employees cannot leave their post until relieved.

4.3.3.13 Trained personnel shall be made available to respond in a timely manner to provide emergency first aid and cardiopulmonary resuscitation.

4.3.3.14 NRC shall maintain a periodic log or checklist of continuous air monitoring results. Log entries should not exceed 15 minute intervals.

4.3.3.15 The area around the Inert Entry Operation must be barricaded to limit personnel in the area. The perimeter of this regulated area will be a minimum of 4 feet from the vessel opening or manway.

4.4 Non-entry Rescue Procedures

4.4.1 Non-entry rescue operations shall be facilitated as much as possible in order to decrease the risks associated with emergency entry into a confined space. All company attendants shall be trained to perform non-entry procedures.

4.4.2 Retrieval systems or methods shall be used for all entries into permit required confined spaces unless the retrieval system would increase the overall risk of the entry or would not work adequately in the space being entered.

4.4.3 Retrieval systems shall consist of chest or body harnesses with a retrieval line attached to the center of the entrant's back, near shoulder level. The retrieval line shall be attached to either a fixed point or, for spaces more than five feet deep, a mechanical device. The fixed point or mechanical device shall be located outside the confined space.

4.4.4 Wristlets may be used in lieu of the chest or full body harness if it can be demonstrated that the use of a chest or full body harness is infeasible or creates a hazard and that the use of wristlets is the safest and most effective alternative.

4.5 Site Specific Contingency / Emergency Plan / Drills

4.5.1 NRC employees working on high hazard gas sites or confined space entries, will be aware of site owner's specific contingency / emergency plan provisions including evacuation routes and alarms.

4.5.2 Employees should participate in emergency evacuation drills and practice rescue procedures on site.

5.0 CONFINED SPACE ENTRY PROCEDURE

5.1. Permit System

NRC requires a confined space permit for each confined space regardless of characterization of space. This provides a documented work plan for each employee and ensures that all cautionary steps have been taken prior to entry. NRC will not

reclassify spaces as Non-Permit regardless of the atmospheric hazards, testing, engineering controls or other control measures.

5.2 All “permit required confined space" entries will be preceded by the completion of a confined space entry permit.

5.3 All confined space entry permits will address the following:

- Location and description of space
- Past and present contents of the tank
- Hazards Isolation
- Lock out / Tag Out
- PPE and special equipment
- Designate who will perform air monitoring
- Air monitoring requirements and results of such monitoring
- Personal monitoring
- Training required
- Specifically designate Confined Space Supervisor
- Specifically designate attendant(s) by name
- Specifically designate entrants by name
- Attendants to be present as alternates
- Communication procedures
- Emergency / rescue procedures
- Confined space classification
- Posting of notification
- Rescue Plan, Personnel, Communication, Equipment, PPE

5.4 Reviewing Permit Prior / During Entry

Confined Space Supervisor will ensure that all entrants and attendants are providing opportunity to review permit and provide input regarding data that does not seem to be covered or explained (unauthorized entry, hazards not covered by the permit, injury response, etc).

5.5 Canceling the Permit

The Confined Space Supervisor will ensure that the permit has been cancelled after operations have been completed each day or when there has been a change in conditions from those originally identified on the permit.

5.6 Review of Air Monitoring Data Prior to / During Entry

5.6.1 The Confined Space Supervisor will ensure that each entrant and attendant have reviewed, understand and have faith in the air monitoring data used to determine confined space conditions and required protective equipment.

5.6.2 Additionally, entrants and attendants will agree upon method of communication of ventilation and air monitoring results change during confined space work.

5.7 Changes of Conditions / Declassification of Space

If any hazards that differ from original permit conditions arise within a space, each employee in the space shall exit the space. The NRC entry supervisor shall then reevaluate the space and determine whether a new permit and entry procedures must be issued.

5.8 Use of Contractors in Confined Space

When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry or confined space entries, the host employer shall:

(A) Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of this section, section 5158 or section 8355, depending on which section applies to the contractor; (B) Apprise the contractor of the elements, including the hazards identified and the host employer's experience with the space, that make the space in question a permit space; (C) Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near permit spaces where contractor personnel

will be working; (D) Coordinate entry operations with the contractor, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by subsection (d)(11); and (E) Debrief the contractor at the conclusion of the entry operations regarding the permit spaced program followed and regarding any hazards confronted or created in permit spaces during entry operations.

5.9 Multi-employers working in Confined Space

It is NRC policy that multi-employers will **not** work simultaneously in the confined space. Each employer will write their own confined space permit and assume responsibility for their own employees and work duties.

5.10 Reevaluation of Space

Confined Space Supervisor will ensure that entrants and attendants are aware of method of communicating a possible change in space condition and the opportunity to reevaluate the space. Employees and their representatives are entitled to request additional air monitoring at any time. The request for reevaluation may occur during a scheduled break or communicated to the attendant depending upon potential safety risk. This change in condition may necessitate a work stoppage, egress and reevaluation of the entire permit prior to re-entry.

5.11 Permit Retention

NRC shall retain each cancelled entry permit for at least one year to facilitate review of the permit space program by a qualified person as required by subsection (d)(4). Any problems encountered during an entry operation shall be noted on the pertinent permit and communicated to the NRC Corporate Safety Manager so that appropriate revisions to the permit space program can be made.

6.0 TRAINING / DOCUMENTATION

6.1 Training:

6.1.1 NRC will provide training at no cost to all employees whose duties include working in or around a confined or inert space; in confined space entry, gas hazards, confined space rescue and the hazards associated with confined space work. The confined space training will ensure that affected employee possess the understanding, knowledge, and skills necessary for the safe performance of the duties assigned. Training will be in a language and vocabulary that the employee can understand.

6.1.2 Training shall be provided to each affected employee:

(A) Before the employee is first assigned duties under this section; (B) Before there is a change in assigned duties; (C) Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained; (D) Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required by subsection (d)(3) or that there are inadequacies in the employee's knowledge or use of these procedures.

6.1.3 NRC must certify that the required training has been accomplished. The training / certification will include the employee name, trainer, signature/initials and dates of training.

6.1.4 This training, including gas hazards, will be conducted before initial assignment and annually thereafter.

6.1.5 Training will cover the following:

GENERAL CONFINED / INERT SPACE TRAINING		
Hazard Recognition	Air Monitoring, capabilities and limitations	
Respirator Use	First Aid	Lockout Procedures
Safety Equipment	Rescue Drills	Permit System
Safe Work Practices	Emergency Entrance / Exit	
Communication Requirements		Inert Space
GAS HAZARD AWARENESS TRAINING		
Location of Alarm Stations	Gas Monitoring Equipment –portable and fixed	
Gas Alarms	Gas Hazards-characteristics of gases including oxygen deficiency, oxygen / nitrogen enrichment, carbon monoxide, hydrogen sulfide	
Any plant, department or confined space gases of concern		Signs and symptoms of over exposure
Personnel rescue procedures		Staging Areas-primary and secondary
Use and Care of SCBA including donning and emergency procedures (if applicable)		Evacuation Procedures

6.2 Training / Certification Documentation

6.2.1 All training, including gas hazard awareness, inert spaces will be documented and available for review.

6.2.2 Training will be documented on a certificate and on the corporate training matrix.

6.2.3 The certificate or documentation shall include employee name, trainer name and/or initials, date of training.

6.2.4 The certificate must be made available to the employee or their authorized representative.

7.0 ATMOSPHERIC TESTING AND MONITORING

7.1 Initial Monitoring - Entry into a confined space is prohibited until initial monitoring of the atmosphere for oxygen content and toxic gas concentration is conducted from the outside. Initial monitoring gives critical information concerning oxygen level, flammability and toxicity hazards.

7.2 Hot Work - All hot work is prohibited in confined spaces in which monitoring indicates that there are flammable compounds in excess of 10% of the Lower Explosive Limit (LEL). The monitoring device must be intrinsically safe for flammable atmospheres or explosion proof. If hot work must be performed in the confined space, a hot work permit must be completed. Cutting gas cylinders and welding machines will not be taken into confined space.

7.3 Air Monitoring Instrumentation

7.3.1 Four Gas meter / PID will be provided for general space monitoring.

7.3.2 Personal portable detectors will be used by each confined space entrant in high gas hazard areas (potential IDLH).

7.4 Calibration

7.4.1 All monitoring equipment will be calibrated once a month per manufactures recommendations.

7.4.2 Calibration records will be kept for a minimum of one year from the date of measurement. Calibration records are maintained electronically via Industrial Scientific INET Services; see your Safety Manager for records as needed.

7.4.3 The response charts associated with the calibration gas will be kept with the 4-Gas / PID meter at all times.

7.4.4 Daily bump tests are required to be completed at the beginning of each day the monitor is in use per manufacturer's guidelines to insure the monitor is functioning correctly.

7.5 Oxygen Requirement - The percent oxygen for entry will not be less than 19.5% for confined space entry unless supplied air respirators are utilized. If oxygen levels are greater than 22%, the confined space must be ventilated prior to any "hot work." Any oxygen reading above or below 20.9% will be reported to the project manager before further entry is attempted. In the event of deficient oxygen, the tank will be ventilated until such time as the level of O2 is brought up to 20.9%.

7.6 Permissible Exposure Limits (PEL) – NRC employees will be provided with and will be required to properly use protective clothing and respiratory protective equipment when contaminants in the atmosphere reach or exceed the PEL. The personal protective equipment (PPE) selected will reduce exposure to contaminants to acceptable levels.

7.7 Dedicated Monitoring of Multiple Confined Spaces - In the event of multiple / simultaneous confined space entries, a single attendant will not be used to monitor each space. It is not feasible for one attendant to safely monitor more than one space at the same time.

8.0 LABELING AND POSTING

8.1 Any signs warning of dangers in the work area will be in English and the predominant language of any non-English reading workers.

8.2 All entrances to confined spaces at NRC facilities and on-going projects will have appropriate signs posted. The signs should include the following, if applicable:

Danger
Confined Space
Entry by Permit Only

The following statements shall be added where necessary:

Respirator Required for Entry
Lifeline Required for Entry
Hot Work Permitted
No Hot Work

8.3 Emergency numbers will be conspicuously posted near the work area or at the telephone nearest the work area.

9.0 SAFETY EQUIPMENT AND PPE

9.1 All necessary equipment (PPE, communication, testing, ventilation, etc.) shall be provided to the employee at no cost and maintained in the proper manner.

9.2 The Project Manager or Site Supervisor shall determine, and list on the confined space permit, the necessary safety equipment and PPE.

9.3 The Site Supervisor will ensure that the safety equipment is properly used and is maintained in the proper working condition.

9.4 These PPE items may include, but are not limited to:

Eye Protection	Face shields	Hard hat
Safety shoes or boots	Hearing Protection	Respiratory Protection
Alarms	Harnesses	Lifelines
Wrist Harnesses	Fall Protection	
Barricades	Retrieval System	

9.5 Respiratory Protection Program

9.5.1 A respiratory protection program will be in place and established in accordance with 29 CFR 1910.134.

9.5.2 NRC program requirements include: quantitative fit testing, pulmonary function tests, and documented fitness for duty.

10.0 WORK PRACTICES

10.1 Purge and Ventilation - During purge and ventilation procedures, blower controls will be a safe distance from the confined space. Initial testing is to be conducted prior to purge/ventilation to determine what precautions are necessary. If a flammable atmosphere exists, all electrical equipment must be intrinsically safe or explosion proof. Continuous ventilation will be required when welding or painting in a confined space, or where a toxic atmosphere may form from desorption from walls, or evaporation of chemicals. Ventilation systems must not prevent egress from the area or interfere with communications.

10.2 Exhaust of Confined Space Gases – Duct work will be installed on the exhaust outlet for the confined space to insure that any purged gases are directed away from work/decon/support or ignition source areas.

10.3 Bonding/Grounding – all ventilation equipment will be bonded and grounded to isolate and remove the potential static discharge.

10.4 Isolation / Lock-out / Tag-out - Each confined space will have isolation procedures specifically developed. The confined space must be completely isolated from all systems by physical disconnect, block and bleed, or blanking and tagging.

Electrical systems must be de-energized and locked out. All systems should be checked for stored energy before any entry into confined space is attempted.

10.5 Cleaning - Cleaning procedures will be reviewed and approved by the qualified person. Initial cleaning will be conducted from outside the tank whenever possible to minimize exposures to employees. Cleaning may be accomplished by flushing with water or chemical cleaners. At times the use of a "Butterworth" cleaning head may be required. In any case, the cleaning method must be reviewed before entry is performed.

10.6 Protection of Employees During Entry Into Confined Space

The NRC Confined Space Supervisor will ensure that sufficient barricades and warning signs have been installed to protect entrants from external hazards. The Confined Space Supervisor will verify that all pre-entry conditions including air monitoring, lockout, rescue plans etc. have been conducted and in place prior to initial entry.

11.0 EQUIPMENT AND TOOLS

All equipment used in confined space operations will be inspected and meet the following minimum requirements:

- Hand tools will be kept clean and in proper working condition;
- Electric tools, equipment and lighting will be intrinsically safe or explosion proof for flammable atmospheres and be equipped with ground fault circuit interrupters (GFCI);
- Extension cords will be industrial quality, 3 wire and 12 gauge as a minimum;
- With the exception of SCBA tanks or life saving equipment, compressed gas cylinders will never be taken into a confined space;
- Ladders and scaffolding will meet or exceed OSHA requirements contained in 29 CFR 1910.25-28.

12.0 REVIEWING WRITTEN PROGRAM

Corporate and Safety Managers will review the NRC Permit required confined space program using the cancelled permits for previous year's projects. The purpose of this review is to revise the program as necessary to ensure that employees are adequately protected.

NRC LOCATION:	**A COPY OF THIS PERMIT MUST BE POSTED AT THE SITE UNTIL ENTRY IS COMPLETED**
CUSTOMER:	
ADDRESS:	NOTE: THIS PERMIT IS VALID FOR EIGHT (8) HOURS FROM THE EFFECTIVE TIME, UPON EXPIRATION, IT MAY BE RENEWED ONLY ONCE FOR AN ADDITIONAL FOUR (4) HOURS.
JOB #:	
THIS PERMIT IS EFFECTIVE: DATE: TIME: / THIS PERMIT EXPIRES: DATE: TIME:	
PERMIT APPROVED BY:	EMERGENCY EVACUATION ALARM DEVICE: □ Horn □ Whistle □ Verbal Communication
ENTRY COMPLETED: DATE: TIME: / THIS PERMIT CANCELED: DATE: TIME:	ATMOSPHERIC MONITORING DEVICE USED: Model: S/N:

DESCRIPTION AND DIAGRAM OF THE CONFINED SPACE TO BE ENTERED:

TANK #:_____

LAST CONTENTS OF THE CONFINED SPACE:_____

EXPLAIN THE PURPOSE OF ENTRY/ WORK DESCRIPTION:_____

_____

POTENTIAL HAZARDS OF THE CONFINED SPACE (CHECK ALL THAT APPLY)		
□ Vapor Hazards	□ Liquid Hazards	□ Vertical Drop
□ Trip Hazards	□ Slippery Surfaces	□ Poor Lighting
□ Low Overhead	□ Sloped Floor	□ Pits / Sumps
□ Restricted Movement	□ Obstructions	□ Other_____
□ High Temperature	□ Dust / Particle	

HAZARD AND ENERGY CONTROL / ISOLATION OF THE SPACE? (CHECK ALL THAT APPLY)				
PRODUCT CONTROL	ELECTRICAL HAZARD	PIPING HAZARD	MECHANICAL HAZARD	OTHER HAZARD CONTROL (LIST):
□ Inerting	□ Lockout	□ Lockout	□ Lockout	_____
□ Purging	□ Tagout	□ Tagout	□ Tagout	_____
□ Flushing	□ Disconnect	□ Blinded	□ N/A	
□ Ventilation	□ N/A	□ Disconnect	□ Other	

PERSONAL PROTECTIVE EQUIPMENT REQUIRED (CHECK ALL THAT APPLY)		
□ Hard Hat	□ Rain Gear	□ Fire Retardant Clothing
□ Safety Shoes/Boots	□ Acid Suit	□ Impervious Gloves - _____
□ Safety Glasses	□ Face Shield	□ Other _____
□ Hearing Protection	□ Safety Harness	□ Other _____

RESPIRATORY PROTECTION REQUIRED (CHECK ALL THAT APPLY)

□ Half Face Respirator (Cartridge Type): _____
□ Full Face Respirator (Cartridge Type): _____
□ SCBA
□ Airline / Emergency Escape Pack
□ OTHER (LIST): _____

ENTRY EQUIPMENT REQUIRED (CHECK ALL THAT APPLY)	ROLES AND RESPONSIBILITIES (Print Names)	
□ Lighting	ENTRY SUPER._____	ENTRANTS:_____
□ Communication w/ Entrant	ATTENDANT(S):_____	_____
□ Continuous Atmospheric Monitoring	_____	_____
□ Tripod and Rescue Winch	RESCUE PERSON(S)_____	_____
□ OTHER (LIST):_ _____	_____	_____
	_____	_____

AIR MONITORING

Date of last meter calibration: __/__/__

Date and time of last Bump Test: __/__/__ __:__ AM/PM

	Time	VOC	0xygen	H2S	LEL	CO	Monitoring By:
Action Level	**N/A**	**See HASP**	**19.5% 23.5%**	**≤10ppm**	**≤10%LEL**	**<25 ppm**	
Pre-Entry							
Periodic Testing							

RESCUE PLAN

RESCUE/ENTRY EQUIPMENT				
□ Body Harness □ Stokes Basket □ Safety Lines	□ Pulley □ Tripod/ Rescue Winch □ Self Retracting Lifeline	□ Anchor Straps □ Webbing □ Prusik □ SKED	□ Wristlets □ Confined Space Ladder □ Boatswains Chair	□ Other: _____ _____
RESCUE COMMUNICATION				
Communication - Attendant to Entrants: □ Radio □ Audible Signal □_____ □_____				
Communication – Attendant to Rescue Team: □ Radio □ Audible Signal □_____ □_____				
RESCUE DESCRIPTION				
Method of Rescue: □ Non-Entry □ Entry □ Multi-Level				
Extraction: □ Vertical □ Horizontal				
Anchorage: □ Tripod □ Beam □ Davit Arm □ Support Column □_____ □_____				
RESCUE PPE REQUIRED:				
DESCRIPTION OF RESCUE SEQUENCE				

ENTRY LOG

NAME	TIME IN	TIME OUT

	SAFETY MANAGEMENT SYSTEM	
	Job Hazard Analysis Confined Space Entry	Revision: 04/2016

TASK DESCRIPTION:

SUMMARY OF POTENTIAL HAZARDS (Check applicable)		
☐ Heavy or awkward lifting / movement	☐ Pinch Points or caught between	☐ Lockout / Tag Out
☐ New / Inexperienced employees	☐ Ladders / Fall	☐
☐ Confined Space	☐ Walking / Working surfaces	☐

APPLICABLE REGULATION / SOPS / ALERTS			
☐ SMS 16.1 Confined Space	☐ SMS 16.1.1 CS Permit	☐ SMS 25.1 Lockout	☐

MINIMUM PERSONAL PROTECTIVE EQUIPMENT (Check applicable)				
☐ Level A	☐ Hard Hat/Chin Strap	☐ High Visibility Vest	☐ Leather Steel Toe Boots	☐ _____
☐ Level B	☐ Safety Glasses	☐ Long Sleeves / Coveralls	☐ Disposable boot covers	☐ _____
☐ Level C	☐ Face Shield	☐ Chemical protective clothing	☐ Neoprene Steel Toe Boots	☐ _____
☐ Level D	☐ Hearing Protection	☐ Respirator:_____	☐ Gloves:_____	

JOB HAZARD ANALYSIS

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
1. Job Site Discussion	• Unknown hazards • Assess capability of crew • Hazard Communication	• Discuss layout and tasks of CSE. • Discuss prior or current contents of tank. • Determine training / experience of crew. • Plan method of entry / egress of CSE. • Determine if Hole Watch is visual or audible.
2. Task Assignments	• Qualified personnel • Inability to perform safe entry • Inability to perform rescue	**Supervisor will assign and designate:** • Confined Space Supervisor • Entrants • Attendants • Hole Watch • Rescue Team
3. Assess Confined Space Interior	• Unknown atmosphere • Slippery surfaces • Engulfment • Mechanical hazards	• Confined Space Supervisor will ensure space evaluated prior to entry. • CS interior visually inspected from outside. • All readings documented on CS Permit. • Confined Space can NOT be entered until characterized and PPE level determined. **Air Monitoring Performed from outside:** • Oxygen (19.5 -23.5 %) • LEL (< 5%) • H2S (< 10 ppm) • Carbon Monoxide (< 25 ppm) • PID (< 25 ppm)
4. Assess Confined Space Access	• Falls from elevation	• Access ladder inspected for safety. • Determine need for Entrant fall protection. • Ladders must be secure and safe by design. • Ladder should provide 3 foot access rail above entrance hole. • Determine need for separate NRC ladder installed if Confined Space ladder unsafe.
5. Confined Space Rescue Plan	• Slips / falls unconscious • Hazardous atmosphere • Rescue capability	• Determine method of rescue based on space design. • Design for non-entry rescue.

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
6. Site Safety Plan	• Required for all NRC tasks • Task description / assignments • PPE appropriate to tasks	• Document hazards. • Document potential atmosphere. • Determine if Level B / C / D respirator. • Determine Action Levels for upgrading or evacuation from Confined Space. • Equip personnel in PPE appropriate for contaminants and conditions.
7. Lockout / Tagout	• Electrocution • Caught by • Contact / crushed	• Identify all mechanical / hydraulic and power sources to confined space. • Lockout per NRC procedure.
8. Determine / Design Ventilation	• Hazardous atmosphere • IDLH • System	• Determine need for ventilation based upon air monitor results. • Design system for maximum efficiency (i.e. influent / exhaust). • Determine safe area for ventilation egress (i.e. where the exhaust will be directed).
9. Determine Lighting	• Slip / fall • Unknown hazards	• Determine amount of general or task specific illumination required. • Provide hard hat lights or supplemental. • Secure all supplemental lighting.
10. Confined Space Permit	• Required for all NRC CSE	• Document readings and action levels. • Designate assignments by name. • Clearly defined Air Monitor Action levels. • Entry team review / sign permit prior entry.
11. Access tank top to set up tripod, hoses	• Falls from elevations • Strain from heavy / awkward loads	• Use articulating man-lift to move equipment to tank top. • All employees wear full body harness with fall restraint lanyards attached to man-lift cage. • Once on top of tank, both the entrants and attendant will remain attached to fall restraint. • Set up tripod and winch. • Ensure tripod / winch system operational and provide access / egress capability.
12. Equipment Set Up Outside Space	• Carbon monoxide • Hazardous noise • Trip hazards	• Position combustion engine powered equipment far enough away from confined space to ensure carbon monoxide will not accumulate in the work zone. • Provide (ABC) fire extinguishers at all entrances and by each piece of support equipment. • For vertical entries (top of tank), clear away all debris around the openings and reposition any equipment or material having the potential to fall in and injure working personnel. • Remove / identify any tripping hazards that may be in work area (hoses, tools, rocks, airlines, oil, mud, etc.). • Re-inspect critical equipment to ensure the lighting, radio equipment, airlines and respirators are in good order.

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
13. Confined Space Pre-Entry	• Hazardous atmospheres • Slip / fall • Escape difficulties	• Complete / review Confined Space Permit. • Plan and discuss escape route / rescue. • Ensure retrieval system operational. • Activate ventilation system. • Monitor atmosphere inside tank / container before and during each entry. • Establish communication method for change of conditions. • Re-inspect equipment to ensure lighting, radio, airlines and respirators in good order. • Inspect entrants and ensure they are in correct PPE as defined on HASP. • Ensure Hole Watch in position to see entrants and / or communicate with them.
14. Confined Space Entry Assignments	• Heat Stress • PPE failure	**Hole Watch Duties:** • In PPE of same or higher level as entrants. • Monitor entrants for signs of erratic behavior (slurred speech). • Provide feed-back on monitor levels. **Confined Space Supervisor Duties:** • Schedule breaks to allow ability to assess employees outside space. • Maintain contact with Hole Watch for updates.
15. Confined Space Entry	• Heat Stress • PPE failure • Slip / fall	• Lower tools / parts to entrants so they do not have to carry them up or down ladder. • Ensure entrants clear of ladder before lowering supplies.
16. Working Inside Confined Space	• Physical / mechanical hazards • Slip / trip / fall • High / low ambient temperatures	• Be aware of any tripping hazards that may be in the work area (hoses, tools, rocks, airlines, oil, grease, mud). • Ensure contact with Hole Watch. • Move single file and utilize buddy system. • Hole Watch monitor workers for signs of heat stress, fatigue, health issues, etc.
17. Pressure Washing Inside Confined Space	• Slip / fall • Laceration • Line of Fire • Chemical Burns, eye damage	• Refer to pressure washing JHA. • Ensure no entrants in Line of Fire. • Do not change position with gun on. • Proper PPE including Hard Hat with chin strap.
18. Exiting the Space	• Slip / fall	• Contact attendant prior to exit. • Initiate fall protection system. • 3 point contact on ladder at all times.
19. Demobilization of Equipment	• Secondary contamination	• Gross decontamination on tank top to prevent migration or cross contamination. • Once personnel and equipment lowered to ground, additional decontamination performed.

REVIEW

Development Team	Position/Title	Reviewed By	Position/Title	Date
Marc Palmisano	EH&S Manager	Ken Koppler CIH, CSP	EH&S Director	4/20/2016

ACKNOWLEDGEMENT

Employee Name	Signature	Date

	SAFETY MANAGEMENT SYSTEM	
	Job Hazard Analysis Articulated Forklift Operation	Revision: 04/2019

TASK DESCRIPTION: Operating tire mounted Articulated Forklift ☐ Load ☐ Lift ☐ _____

General Task is

SUMMARY OF POTENTIAL HAZARDS (Check applicable)		
☒ Heavy or awkward lifting / movement	☐ Overhead Hazard	☒ New / Inexperienced employees
☒ Struck / Crushed	☒ Suspended Loads	☒ Pinch Points / Caught between
☒ Rollover	☐ Electrical Power lines	☐
APPLICABLE REGULATION / SOPS / ALERTS		
☒ SMS 19.1 Heavy Equipment	☐	☐

MINIMUM PERSONAL PROTECTIVE EQUIPMENT (Check applicable)				
☐ Level A	☒ Hard Hat	☒ High Visibility Vest	☒ Leather Steel Toe Boots	☒ Chemical impervious gloves
☐ Level B	☒ Safety Glasses	☒ Long Sleeves / Coveralls	☒ Disposable Boot Covers	☐ _____
☐ Level C	☒ Face Shield	☒ Chemical Protective Clothing	☒ Neoprene Steel Toe Boots	☐ _____
☒ Level D	☒ Hearing Protection	☒ Respirator: FF Multi gas	☐ Gloves: Leather	

JOB HAZARD ANALYSIS

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
1. Pre-operation Safety Check	• Unqualified operator • Using defective or damaged equipment	• One trained/qualified operator with full understanding of the design, stability, controls and instruments shall operate the grade-all forklift. • A complete inspection of the equipment meeting the manufactures guidelines shall be completed and documented prior to use. • Contact the Site Supervisor and report any deficiencies. DO NOT USE DAMAGED EQUIPMENT.
2. Site Preparation	• Contact with Utilities • Overhead hazards • Steep slopes	• All Overhead utilities will be identified and marked prior to operations. • Site perimeter barricades will be constructed to prevent unauthorized persons from entering the work area. • Ensure that adequate distance is maintained from any source of electricity. • Inspections or determinations of road conditions and terrain shall be made to assure that clearances and load capacities are safe for the passage of equipment. • Operate Articulating Forklift only on grades specified by the manufacturer.
3. Orientation / Attachments	• Unsafe attachments • Fall protection	• Use only approved attachments and equipment with Articulating Forklift. • Identify and label all machine controls and ensure they are working properly. • Check equipment on ground level prior to operations. • Secure lanyard and harness to latch attachment prior to operations. • Make frequent visual inspections of all hydraulic systems. • Conduct visual and operational checks on all machine systems and operating controls before use. • Do not exceed load capacities when lifting material.

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
4. Operating the forklift	• Struck by • Crush • Damage to equipment/facilities • Overhead power lines	• The operator is to use the seat belt at all times. • Utilize a spotter when maneuvering. • Watch for power lines and stay a minimum of 10 feet away. • Ensure all ground personnel maintain eye contact when walking near the forklift operation. • Stay out of blind spots. • The operator is to stop if he/she is unaware of the location of any nearby ground personnel. • No riders other than the operator.
5. Loading / Unloading	• Struck by • Crush • Rollover • Overloading	• The operator is to use the seat belt at all times. • Utilize a spotter when maneuvering, stacking or loading materials. • Adjust forks as wide as possible to support the load. • Carry load low to ground if possible. • Never lift loads over ground personnel. • Be aware of uneven terrain.
6. Parking	• Struck by • Crush	• Never exit the forklift until the lifting mechanism is on the ground, the controls are in neutral and break is set. • If you are more than 25 feet away or cannot see the equipment, turn off the engine.
7. Working around overhead lines	• Overhead Utilities	• Maintain safe distance from energized electrical utilities. • Spotters will be used anytime equipment is moving within 10 feet of overhead hazards. • Operator will use guide-on to prevent accidental contact or close proximity arcing. • Ensure swing radius and path do not contact any overhead utilities. Power Line Approach Distances Voltage — Minimum Clearance 600 - 50,000 — 10 feet 50,000 - 75,000 — 11 feet 75,000 - 125,000 — 13 feet 125,000 - 175,000 — 15 feet 175,000 - 250,000 — 17 feet 250,000 - 370,000 — 21 feet 370,000 - 550,000 — 27 feet 550,000 - 1,000,000 — 42 feet
8. General Work Area	• Hazardous Noise	• Combination of engine operation from Articulating Forklift and support equipment present potential for noise levels > 85 dBA. • Operator and all ground support personnel will wear hearing protection at all times equipment is in operation.
9. Atmospheric Conditions	• Inhalation of hazardous vapors	• The decontamination site will be monitored by and employee with CTEH to determine if Respirator Use is needed. Please see atmospheric hazards table in the HASP

REVIEW

Development Team	Position/Title	Reviewed By	Position/Title	Date
Ken Koppler CIH, CSP	EH&S Director	Ken Koppler CIH, CSP	EH&S Director	2/25/2016
Paul Morcos	So-Cal EH&S Manager			
Mark Theriot	HSEQ Manager			

ACKNOWLEDGEMENT

Employee Name	Signature	Date

	SAFETY MANAGEMENT SYSTEM	
	Job Hazard Analysis Slip / Trip / Falls From Ground Level	Revision: 08/2015

TASK DESCRIPTION:

SUMMARY OF POTENTIAL HAZARDS (Check applicable)		
☐ Heavy or awkward lifting / movement	☐ Slip on wet / icy surfaces	☐ Strain knees / back on pitched slopes
☐ New / Inexperienced employees	☐ Working and walking surfaces; slip, trip, fall	☐ Strain ankles
☐ Falls From equipment	☐ Elevated surfaces / Fall / Ladders	☐
☐ Trip on obstacles	☐ Excavation / steep slopes / loose sides	☐
APPLICABLE REGULATION / SOPS / ALERTS		
☒ SMS 23.2 Slip/Trip/Falls	☐ SMS 22.1 Fall Protection	☒ Safety Alert-Yellow Boot Covers-11/2014

MINIMUM PERSONAL PROTECTIVE EQUIPMENT (Check applicable)				
☐ Level A	☐ Hard Hat	☐ High Visibility Vest	☐ Leather Steel Toe Boots	☐ _____
☐ Level B	☐ Safety Glasses	☐ Long Sleeves / Coveralls	☐ Disposable boot covers	☐ _____
☐ Level C	☐ Face Shield	☐ Chemical protective clothing	☐ Neoprene Steel Toe Boots	☐ _____
☐ Level D	☐ Hearing Protection	☐ Respirator:_____	☐ Gloves:_____	

JOB HAZARD ANALYSIS

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
1. Designate walkways	• Obstacles • Slippery • Potholes • Uneven surfaces	• Plan route to avoid obstacles and irregular surfaces. • Keep all designated travel ways clear of debris, cords, clutter, etc. • Ensure sufficient lighting at all times and in all places to illuminate walkway. • Immediately correct any unsafe trip hazards. • 'Designate' means that a safe path is located; cleared of trip hazards and marked in such a manner that it is obvious to all site personnel as the 'designated path'. • Don't string cords, lines or hose across pathway.
2. Provide safe walkway down grades, steep elevations	• Fall • Strain on knees	• Designate route with least pitch and / or ground debris. • Install ***Fixed Descending Lines*** for steep grades using ¾" diameter manila or hemp rope. • Rope for descending line should be anchored to route and taut. • Personnel will be instructed to hold line with one hand while walking down or up pitched grade. • Canvas or leather gloves are recommended to prevent rope burn.
3. Identify / eliminate slippery work areas	• Slip / fall	• Secure mats, rugs, or carpets to ensure they lay flat. • Place absorbent mats or carpet strips over slippery areas like decontamination foot paths. • Use wet floor signs if wet surfaces can't be avoided.
4. Stairways	• Slip / fall • Twist ankle	• Ensure stable handrails for stairs. • Always use handrails going up or coming down stairs. • Take each step one at a time. • Look at each stair tread / step before stepping down or up. • Don't carry material which obscures vision or prevents three point contact.
5. Elevations >6 feet in height	• Fall • Traumatic injuries	• Refer to SMS 22.1 • Develop separate fall protection plan.

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
6. General Site Movement	• Slips/trips/falls	• Maintain good traction between boots and walkways. • Use dedicated walkways and handrails. • Do not take short cuts or step over or on things. • Never jump on or off stairs, docks, equipment, etc. • Do not over stride, take deliberate normal steps. • Maintain good balance at all times. • Contact supervisor if walkway requires jumping across. • Always stay attentive and watch for potential hazards. • Avoid oil, grease, or dark/shiny spots in walkways. • Avoid hidden steps, or irregular / slippery surfaces. • Incorporate the ***buddy system*** and watch out for each employee to ensure they are not taking shortcuts, stepping over items or placing themselves in an unstable position. • Don't carry items that limit view in any direction. • Isolate and stay 6 feet back from unprotected edges.
7. Utilize Proper PPE	• Strain ankles • Rope burns	• Use leather boots with ankle support and steel toe. • Ensure that soles are proper type for work performed and surfaces. • Do not use disposable latex boot covers on wet / slick surfaces. • Utilize leather / canvas glove with descent lines.
8. Good Housekeeping	• Clutter • Trip / fall	• Inspect work area at end of task and remove or cleanup any materials or liquids. • Stay organized / a place for everything. • Pickup and properly dispose of or store items. • Keep walkways free of clutter.

REVIEW

Development Team	Position/Title	Reviewed By	Position/Title	Date
Mike Amen, CIH,CSP,CHMM	Technical Consultant	Ken Koppler, CIH,CSP	EHS Director	6/16/2015

ACKNOWLEDGEMENT

Employee Name	Signature	Date

TASK DESCRIPTION:

Lift(s) Conducted with Heavy Equipment

SUMMARY OF POTENTIAL HAZARDS (Check applicable)		
☒ Heavy or awkward lifting / movement	☒ Pinch Points or caught between	☒ Excavation / Steep slopes
☐ New / Inexperienced employees	☒ Heat Stress: Hot weather / PPE	☒ Elevated surfaces / Fall / Ladders
☒ Struck by or crush hazard	☒ Noise levels (>85 dBA)	☒ Working and walking surfaces; slip, trip, fall
☐ Confined Space / LOTO	☐ Working On Water	☐

APPLICABLE REGULATION / SOPS / ALERTS		
☒EOM – Use of Excavators/Backhoes on Project Sites and for Lifting Materials	☒EOM – Crane Lifting and Rigging Guidelines	☐

MINIMUM PERSONAL PROTECTIVE EQUIPMENT (Check applicable)				
☐ Level A ☐ Level B ☐ Level C ☒ Level D	☒ Hard Hat ☒ Safety Glasses ☐ Face Shield ☒ Hearing Protection	☒ High Visibility Vest ☒ Long Sleeves / Coveralls ☐ Chemical Protective Clothing ☐ Respirator:_____	☒ Leather Steel Toe Boots (ANSI Z41.1-1991) ☐ Disposable Boot Covers ☐ Neoprene Steel Toe Boots ☒ Gloves ANSI 2	☐ _____ ☐ _____ ☐ _____

MINIMUM PROTECIVE EQUIPMENT AVALIABLE ON SITE (Check applicable)		
☒ Rain Gear	☐Hearing Protection	☐

MINIMUM PROTECIVE EQUIPMENT AVALIABLE ON SITE (Check applicable)
Required Equipment: Heavy Equipment / Rigging / Cribbing / Tag Lines

[1] Each Job or Operation consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. In Column 2, specify the equipment or other details to set the basis for the associated hazards.

[2] A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact**—victim is struck by or strikes an object; **Caught**—victim is caught on, caught in or caught between objects; **Fall**—victim falls to ground or lower level (Includes slips and trips); **Exertion**—excessive strain or stress/ergonomics/lifting techniques; **Exposure**—inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught."

[3] Aligning with the first two columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as "Be careful" or "Use as appropriate."

JOB HAZARD ANALYSIS

❶ Job Steps (Assess)	❷ Potential Hazards (Analyze)	❸ Preventive Measures / Special PPE (Act)
1. Equipment and Work Area Inspection	1a. CONTACT: Property damage and/or personal injury caused by failure of heavy equipment or materials	1a. • An **Exclusion zone must be maintained** around all heavy equipment. **The Exclusion Zone must meet the following minimum requirements:** • A minimum distance of 10 feet from all heavy equipment and loads being moved by the equipment; and • Greater than the swing/reach radius of any moving part on the heavy equipment (i.e., for large equipment this may mean an exclusion zone distance larger than 20 feet); and Greater than the tip-over distance of the heavy equipment. • If the equipment has out riggers, they must be deployed if conducting stationary swing lift; utilize pads or similar load dispersing equipment if conducting stationary swing lift. o Outriggers spread for widest base possible. o Level machine. o Lift machine wheels off ground surface to prevent bouncing and unsettling machine and or load. o If utilizing backhoe, ground front bucket. • Conduct a test lift. Take corrective action if significant factors are determined {imbalanced load, defect / machine, rigging, excessive load, settling}. • Do not move w/ boom extended or in upright position. • The following are required to approach the lifting machine within the swing arm distance: o Machine is de-energized (bucket on the ground, hydraulics locked out),

❶ Job Steps (Assess)	❷ Potential Hazards (Analyze)	❸ Preventive Measures / Special PPE (Act)
		o All clear is given by operator and signal man, o Machine is approached from front, with eye contact with operator. **The "Show me your hands policy has been utilized"** • Do not allow workers to operate under suspended loads • Wear high visibility clothing/safety vest, safety glasses, cut-resistant gloves, hard hat, and steel toe boots
2. Lifting Preparation	2a. CONTACT: Property damage and/or personal injury caused by not following Lift SOPs	2a. • Excavator and all attachments must be inspected and maintained daily at a minimum. • Complete equipment inspection. Do not conduct lift until completed. Only an experienced operator will inspect equipment. • Conduct a site walk, assess potential hazards per the proposed task': o Overhead hazards: canopy, signs, lights, overhead utilities / contact. o Subsurface hazards: drywells, cesspools / collapse. o Level ground surface. o Inspect lift location / stability {improved surface, compaction} o Weather / 35 mph winds, electrical storm. o Review designated, lift and staging areas; swing radius, transit paths and potential obstructions. • Review load chart. • Determine load weights: generic material weights, material tickets, equipment tags, and documentation.
3. Inspection and Setup of Rigging	3a. CONTACT: Property damage and/or personal injury caused by rigging failure	3a. • Inspect rigging materials. • All defective rigging and lifting tackle must be taken out of service. • Only experienced personnel are allowed to set rigging. o Single Leg (Vertical): Simple basic lift, less control o Basket Hitch: each leg gives ½ load. o Choker: Simple 50% – 80% load loss / angle of choke. • Rigging can only be connected / machine / dedicated attachment points, failure to utilize proper attachment points can result in damage to rigging and or improper load security. • Inspect attachment points: D-Rings, hooks, eyelets. Inspect for wear, stress fractures, operable latches, pins, dog-ears.
4. Signalman, spotters	4a. CONTACT: Potential for personal injury or property damage resulting from miscommunication unauthorized personnel	4a. • Designate only one signalman and spotters. • All communication between site personnel and the operator will be conducted through the signalman. • Signals will be reviewed prior to the start of work activities.
5. Tag Lines	5a. CAUGHT: Potential for personal injury resulting from being caught in the tag line	5a. • Tag lines only to be utilized if load is balanced. • Tag lines to be gripped w/ hands, do not wrap around hand, arm, or waist. • Signalman will coordinate the use of tag lines. • Don't stand under suspended loads • Wear high visibility clothing/safety vest, safety glasses, cut-resistant gloves, hard hat, and steel toe boots
6. Site Cleanup / End of Work Day	6a. CONTACT: Potential for unauthorized entry into work area	6a. • Conduct site inspection: fence, equipment, open and backfilled excavations, and stockpiles. Complete check list/permits as applicable. • Demarcate excavation and or stockpiles with construction fence, cones, caution tape. • Secure stockpiles with and on poly sheet • Use sand bags or equivalent to anchor down poly sheets

❶ Job Steps (Assess)	❷ Potential Hazards (Analyze)	❸ Preventive Measures / Special PPE (Act)

REVIEW

Development Team	Position/Title	Reviewed By	Position/Title	Date
Todd Scott	Sr. Project Manager	Albert J Siver	Site Superintendent	

ACKNOWLEDGEMENT

Employee Name	Signature	Date

	SAFETY MANAGEMENT SYSTEM	
	Job Hazard Analysis Pressure Washing: 2500-5000 psi	Revision: 08/2015

TASK DESCRIPTION: Pressure Washing with _____water at _____ PSI using a_____ tip and _____inch wand.

PRESSURE EXCAVATION SPECIFICATIONS	
PSI ☐ 2,500 ☐ 3,500 ☐ 5,000	**WAND** ☐ 18" ☐ 36" ☐ 48" ☐ Other_____
TIP ☐ 0 degree/Cutting/Rotator	☐ 15 degree / Fan ☐ _____ ☐ _____
WATER ☐ Steam / Hot ☐ Cold	**WASHING FLUID** ☐ Soap ☐ Water ☐ Simple Green ☐ Other_____

SUMMARY OF POTENTIAL HAZARDS (Check applicable)		
☐ Laceration	☐ Line of Fire	☐ Noise (>85 dbA)
☐ New / Inexperienced employees	☐ Tight constricted space	☐ Moving equipment
☐ Slips/trips/falls	☐ Fall from height	☐ Zero tip
☐ Heated water / steam	☐ Broken pressure lines (struck by)	☐

APPLICABLE REGULATION / SOPS / ALERTS			
☒ SMS 23.8 Pressurized Equipment	☐ Line of Fire PPT: 3/14/2015	☐ Alert: 11/11/2014	☐ Alert: April 2013

MINIMUM PERSONAL PROTECTIVE EQUIPMENT (Check applicable)				
☐ Level A	☐ Hard Hat	☐ High Visibility Vest	☐ Leather Steel Toe Boots	☐ _____
☐ Level B	☐ Safety Glasses	☐ Long Sleeves / Coveralls	☐ Disposable Boot Covers	☐ _____
☐ Level C	☐ Face Shield	☐ Chemical Protective Clothing	☐ Neoprene Steel Toe Boots	☐ _____
☐ Level D	☐ Hearing Protection	☐ Respirator:_____	☐ Gloves:_____	

JOB HAZARD ANALYSIS

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
1. Secure pressure washer trailer	• Rolling away • Pinch point	• Identify pinch points before starting task. • Keep fingers / hands / feet away from points. • Communicate all movements to assistants. • Chock pressure washer wheels.
2. Pre-equipment check	• Bad hose connections • Improper working of pressure washer valves/pistons etc. • Fire • Pump failure • Burner failure • Break in line causing burst	• Inspect all hoses, gaskets, tips and connections for condition and tightness prior to starting. • Have a minimum of 10 pound ABC fire extinguisher within 25 feet available and unblocked. • Ensure proper pump case, fuel and water levels. • Ensure proper lance length 18", 36", >40". • Ensure proper tip GPM and PSI. • Utilize hose protectors on abrasive surfaces.
3. Prepare safe work zone	• Slip/trip/fall • Back strain • Traffic • Struck by vehicle	• Set up traffic cones / barriers. • Remove trip hazards. • Designated walkway.
4. Attach pressure washer hoses	• High pressure release • Struck by	• Wear full PPE. • Ensure line of fire is clear.
5. Attach Lance gun	• Puncture / injection injury	• Inspect lance gun, tips, fittings for excessive wear. • Ensure proper operation and PSI control.
6. Start Up Pressure Washer	• High pressure release • Injection injury • Heat hazard / fire	• Only qualified personnel will operate. • Emergency procedures reviewed with personnel. • Stress Line of Fire. • Increase pressure slowly to inspect for leaks or equipment malfunction.

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
7. Operation of Pressure Washer General	• Equipment malfunctioning • High pressure release • Noise • Burn from steam • Line of Fire	• Do not exceed Rated Operating pressure. • Increase pressure slowly. • Do not modify machine or parts. • Have one person observing and standing by machine to turn it off in event of emergency. • Coordinate the use of hand signals. • Fill out hot work permit if burners are used. • Visually inspect entire length of hose and by tactile feel. • Wear hearing protection when standing near unit. • Clean equipment often to avoid oil / dirt build-up around trigger.
8. Operator's Use of pressure washer with 15, 25 & 40 Degree tips	• Injury to the operator or others • High pressure release • Injury by injection/puncture • Slips/trips/falls • Equipment hazards • Fire hazard • Flying debris • Exposure to hazardous chemicals, liquids, vapors, waste • Line of Fire	• Only trained and qualified employees. • Don full PPE as described above (face shield must be in down position at all times while in operation). • Operator should ensure proper balance and good footing; do not over extend. • Restrict movement of other employees from pressure wash area (at least 25' away from washer). • Never point pressure washer wand towards others. • Line of Fire: keep safe distance between lance operator and other personnel. • Turn machine off when you are changing nozzles. • When moving the hose or changing equipment location, secure the power and avoid dragging hose across sharp objects or chemicals. • No unauthorized modification is allowed to equipment. • NEVER tie lance gun triggers in open position. • Lance gun must always be pointed at the work area or ground when not in use. • Clean equipment often to avoid oil and dirt build-up around the trigger. • Keep hoses neatly arranged and protected. • Wrap caution tape around hoses if the ground blends in with the hose color to prevent tripping. • NEVER use the pressure washer to clean a part of your body or another person.
9. Operator's Use of pressure washer with 0 Degree cutting or Roto-tip (Turbo)	• Slips/trips/falls • Lacerations, punctures • Equipment hazards • Flying debris	• Only trained and experienced operators. • Don full PPE; including metatarsal guards and other puncture resistant (Kevlar) protection as needed (face shield must be in down position at all times while in operation). • Keep both hands on the gun and lance handle. • All other Critical Actions mentioned above. • NEVER use the pressure washer to clean a part of your body or another person.
10. Shutdown the pressure washer unit	• Injury to the operator or others • High pressure release • Injury by injection/puncture • Slips/trips/falls • Equipment hazards • Fire hazard • Flying debris • Exposure to hazardous chemicals, liquids, vapors, waste	• Slowly decrease the operating pressure and shut off the burner and pump. • Bleed off all pressure from the lance gun and lines before disconnection. • Shut off burner and run pump for 2 – 5 minutes to cool.

❶ Job Steps	❷ Potential Hazards	❸ Preventive Measures / Special PPE
11. Store lance gun & line	• Exposure to hazardous liquids, vapors, waste	• Thoroughly clean the lance gun and line before storage.
12. Pressure washer unit departure	• Struck by • Towing	• Remove and stow wheel chocks. • Ensure stability of hitch. • GOAL (Get Out And Look) before departing.

REVIEW

Development Team	Position/Title	Reviewed By	Position/Title	Date
M. Amen ,CIH,CSP,CHMM	Technical Consultant	Ken Koppler, CIH,CSP	EHS Director	6/25/2015

ACKNOWLEDGEMENT

Employee Name	Signature	Date